Distributional effects of a flat tax: An empirical analysis for the Netherlands

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1997

DISTRIBUTIONAL EFFECTS OF A FLAT TAX

AN EMPIRICAL ANALYSIS FOR THE NETHERLANDS

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Abstract

In this paper, we construct a flat rate/broad base personal income tax system and we compare the distribution of the current personal income tax (including social contributions) in the Netherlands to the distribution of the simulated flat rate tax. Using extended data (personal income panel survey), the effects are simulated of eliminating deductions in exchange for a reduction in tax rates, sufficient to keep personal income tax revenue constant at the initial level and distribution of pre-tax incomes. Our simulations indicate that:

- The redistributive effect of the current rate structure of the Dutch tax system - with marginal rates of 37.5%, 50% and 60% - is substantially diminished by tax deductions. Deductions appear to be very income-elastic.
- After the simulated base broadening, a proportional rate of 33.2% balances the budget (ex ante). Such a flat rate causes only relatively small changes in average tax ratios. For a clear majority of the taxpayers, effects on after-tax income lie within a range of minus/plus 5%.
- Tax progressivity is mainly caused by the fixed personal exemption, which was maintained in the simulated flat rate tax. We calculated only a 7 percent lower income elasticity in a flat rate system.

We conclude that the income effects of the introduction of a broad base/flat personal income tax would be relatively small and cannot be considered as prohibitive.

JEL-classification H22, H24
Keywords flat tax, deductions, progressivity, distribution of the tax burden

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revised version *
September 19th, 1997

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* A previous version of this paper was presented at the 53rd Congress of the International Institute of Public Finance, August 26th 1997, Kyoto, Japan. Extended data from the 1990 income panel survey (Personal Income Distribution 1990) have been made available by the Dutch Central Bureau of Statistics, and are used with permission. During the preparation of this study we have benefitted from discussions with, and helpful comments from Sybren Cnossen, Flip De Kam, Satya Poddar, Peter B. Sørensen, Henk Vording, and participants at the 53rd IIPF Congress. The views expressed as well as any remaining shortcomings are, of course, our own responsibility.

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CONTENTS

1 Introduction

Throughout the last couple of decades, personal income tax systems of most industrialized countries have been (repeatedly) subjected to considerable reform efforts. Many OECD countries implemented tax reforms characterized by base broadening, reduction of tax rates, and flattening of the rate structure (Cnossen and Messere, 1990). Implementing a flat rate personal income tax seems to be in line with these reforms, and could be seen as a major, and final, tax reform. Recently, various proposals for a flat tax have been raised, especially in the USA.[1] The concept 'flat tax' is somewhat ambiguous in political debates and in economic literature, but generally, a flat rate tax system has two key features: a very broad tax base and one fixed rate.

In this paper, we simulate a very simple flat rate personal income tax system for the Netherlands and compare the distribution of the current personal income tax (including social contributions) to the distribution of the simulated flat rate tax. Essentially, the effects are simulated of eliminating deductions in exchange for a reduction in tax rates, sufficient to keep personal income tax revenue constant at the initial level and distribution of pre-tax incomes. Under 'our' flat tax, a uniform proportional rate is levied on a very broad personal income base, where only fixed personal exemptions are deductible from pre-tax incomes.
The paper does not deal with questions relating to the nature of the tax base in the flat rate system (which is a rather hybrid concept, just as in the current system), nor questions regarding timing difficulties, economic and behaviourial effects of such a drastic reform.[2] Instead, we only focus on the question wether drastic base broadening in exchange for a low flat rate would lead to a shift in the tax burden from high to low income earners, i.e. lowering tax progressivity.

For our analysis we use an extensive income panel survey of the Dutch Central Bureau of Statistics (CBS), which covers 217,000 income recipients. Sample data have been

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1 See e.g. *The Economist* January 13th, 1996 and *http://www.senate.gov/comm/jec/general/fltxrept.html.* Earlier proposals for the USA can be found in Hall and Rabushka (1985), Feld (1995), Atkinson (1995). See also European proposals from Frederiksen (1994 and 1996) and Ruiz-Huerta *et al* (1996).

2 See e.g. Atkinson (1995) and Frederiksen (1994 and 1996) for behaviourial effects, such as changes in labour supply.

combined with data from the Tax Administration. As a result, the survey contains the personal distribution of incomes (pre-tax, taxable and after-tax), the distribution of tax liabilities and almost all deductions for the following socio-economic groups: self-employed, civil servants, employees in the private sector, social security beneficiaries (unemployed and disabled), pension earners (oldage and early retirees), and social welfare recipients. Since very detailed data about deductions are available, we are able to construct a very broad tax base (computed as current taxable income plus all applied deductions to be eliminated under such a flat tax). We simulate the combined effect of the elimination of deductions and the lower and uniform tax rate on the distribution of individual taxpayers liabilities.

The paper is organized as follows. Section 2 evaluates pros and cons of implementing a flat rate personal income tax. In section 3 the current personal income tax system in the Netherlands is documented. Section 4 presents the characteristics of the simulated broad base/flat rate personal income tax. The simulated income effects of such a tax reform are presented in section 5. Section 6 concludes the paper.

2 Do We Need A Flat Tax?

Proponents argue that a broad base/flat rate tax system generates less complexities compared to most current personal income tax systems, which cause high administrative costs of taxation (*cf.* McLure, 1996). Administrative and compliance costs of the current income tax and social contributions in the Netherlands, for example, appear to be 4.8% of corresponding revenues.[3] The elimination of deductions - base broadening - could decrease these cost significantly.

Another motivation for tax reform is the distortionary effects of high marginal tax rates on, e.g., labour supply and savings (Frederiksen, 1996). However, following the OECD Jobs Study (1994) on tax reforms in the 1980's, the positive effects of lower tax rates on labour supply seem rather small. Especially the sensitivity for male labour supply seems to be very low.

3 That is, costs of private households (filing tax return), cost of business (withholding), and cost of the Treasury (administration). See Allers (1994).

Thirdly, a flat rate tax system with a very broad base would both alleviate distortions, and reduce the quantity of tax arbitrage options open to taxpayers in the current system. Under current Dutch income tax law capital income is on average taxed much lower compared to labour income on account of political interests (owner-occupied property), social considerations (pension contributions), and economic reasons (capital flight). The lower tax manifests itself in the most important forms of capital income: the rental value of owner-occupied property is taxed negatively, pension savings are taxed at a deferred basis, investment income of pension funds is exempt, and retained profits are taxed proportionally.[4] Also, the portfolio allocation of savings and risk taking is fiscal induced. Individual savings for pension schemes or contributions for life insurances are deductible from pre-tax income, while other savings are not (in general). The effective tax rate of one and the same investment can therefore range from -60% to 74% in the Netherlands.[5] By allowing the size of the tax wedge to vary widely, current taxation violates one of the most fundamental rules of the market, which holds that economic considerations instead of tax motives should determine the choice regarding the organisation, financing and location of activities (Cnossen, 1995). Complexities encourage, and offer, taxpayers a rich menu of possibilities to avoid or to diminish the tax intended by the legislator (tax arbitrage). However, in some cases deductions are meant to encourage a change in behaviour, that is, to attain other policy objectives. Such tax expenditures do have an important disadvantage compared to government expenditures, i.e. no representation of their budgetary impact. Therefore the budget making process is less transparent.

Opponents of the flat tax proposal on the other hand, reject the idea on the basis of equity considerations: higher income groups would pay fewer taxes in a flat rate system than in a progressive tax system. Low and high income earners will be taxed at the same marginal rate. On the basis of the principle of 'ability to pay', one could argue in favour of a progressive rate structure (Van Herwaarden and De Kam, 1983). Moreover, some deductions seem to be fair when the ability to pay principle is employed, for example in case of high expenses for sickness the ability to pay will be lower. Therefore, a related deduction seems logical.

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4 Further details can be found in Cnossen (1995, p.299).

5 Distributed profits are taxed highest (74%) as a result of the so-called 'classical' double tax, while the effective tax rate of capital gains will be -60% in case the investment is financed by foreign capital.

Secondly, the elimination of all deductions and allowances contradicts with the taxable income concept used, mainly because costs of earning income should be deductible from pre-tax income (Stevens, 1996).
Thirdly, drastic base broadening can have substantial adverse economic effects. For example, elimination of the deduction for pension contributions would no doubt affect savings, and the elimination of the deduction of mortgage interest payments would disturb the housing market. Timing and capitalization problems are also relevant here. Thus, a drastic reform as envisaged in our analysis, would in any case require a rather long transition period.

The flat tax to be elaborated for the Netherlands differs to a wide extent from several recent proposals in the USA.[6] Usually, one focuses on a proportional tax rate on labour income allowing a fixed personal exemption: capital income remains untaxed (the Hall-Rabuska type of flat tax exempts the normal return on capital). Under strict conditions, such a proportional wage tax is equivalent to a proportional spending tax or consumption-based tax (*cf.* Pechman, 1990). Therefore, one could argue that these proposals are 'American' induced (Feld, 1995), since it offers an alternative for both the current income tax, and for the value added tax (no VAT in the USA).
A flat tax distincts from a 'dual income tax' as implemented in several Scandinavian countries (see Sørensen, 1994), and as proposed by Cnossen (1995) for the Netherlands. In the Cnossen's proposal, rate structure on labour income remain progressive (30%, 40%, and 50%), but capital income will be taxed at one proportional rate (30%). Following Cnossen, a lower rate on capital income would generate higher tax revenue on capital income. The dual income tax is mainly advocated on efficiency considerations (less distortions, less tax arbitrage). It disregards the principle of ability tot pay, that is all sources of income should be taxed equivalently (*cf.* Stevens, 1996). Furthermore, a dual income tax system encourages high income earners cq. self-employed to present wage income fiscally as capital income (see Sørensen, 1994, pp.73-76).
We elaborate a flat personal income tax which includes labour income as well as capital income in the same tax base (as under current Dutch income tax law). In order to make comparisons, we first present some features of the current system.

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6 See proposals by the Joint Economic Committee (*http://www.senate.gov/comm/jec/general/fltxrept.html*).

3 The Current Dutch System

On January 1, 1990, a major revision of the personal income tax based on the proposals of the Oort Commission became effective in the Netherlands. The main changes in the new legislation were as follows (*cf.* De Kam, 1993):

- The personal wage and income tax was fully integrated with the general social security contributions, with a combined rate and uniform tax base.
- The number of tax brackets was reduced from nine to three. The new top rate of 60% is much lower than the top rate of 72% in the old system. The rate structure has thus been made less progressive.
- The tax base was broadened by Dfl 97 billion or by 63%, mainly by eliminating the deductibility of general social security contributions (Dfl 50 billion) and by lowering personal exemptions (Dfl 39 billion).
- Although the proposals of the Oort Commission were revenue neutral, the actual reform package implied a tax reduction amounting to 0.8% of GDP.

In 1996, the first income bracket (Dfl 45,325) is to be taxed at 37.5%, i.e. a combination of 6.35% taxes and 31.15% social contributions.[7] In the second income bracket - next Dfl 47,448 - tax rate is set at 50%; taxable income above Dfl 92,683 is taxed at 60%. Elderly are taxed at a lower rate in the first income bracket (15.4%), because those over 64 pay only 9.05% social contributions (plus 6.35% in income tax). Taxable income can be derived by subtracting all deductions from pre-tax income.

The distribution of average tax ratios under current tax law depends on both the rate structure, and the distribution of deductions. Figure 1 shows the distribution of applied deductions (aggregated by income class). Deductions seem to be rather income-elastic; the deduction ratio grows sharply with gross income, although it levels off at very high incomes.[8] Furthermore, the fiscal advantage of deductions will be even more income-elastic, because deductions are valued by the marginal tax rate of taxpayers. Accordingly, the distribution of the average tax ratios, appears to be more equally distributed as suggested by the rate structure (see figure 2).

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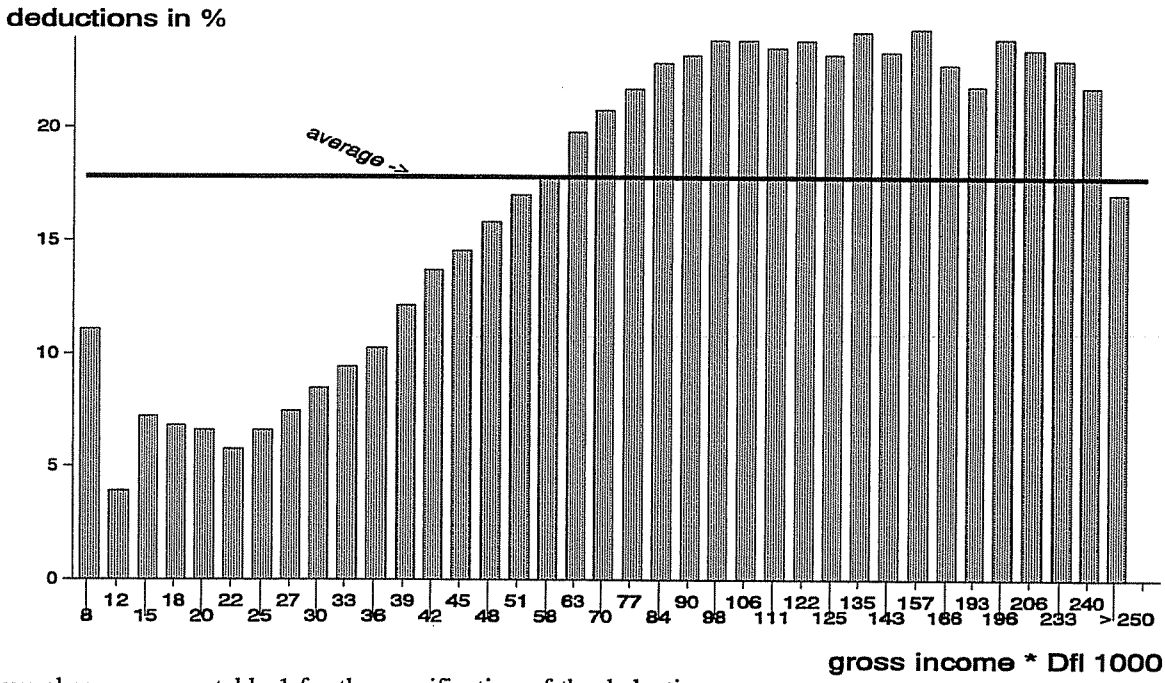
7 1 $US = 1.69 Dfl (average 1996).

8 A broad and comparable income concept - gross income - is defined as a proxy for a non-eroded tax base (see Appendix). Gross income is used as scale-variable for tax ratios and deduction ratios.

Figure 1 Deductions as % of Gross Income



several sources: see table 1 for the specification of the deductions

As a measure for the degree of progression of the tax system, we employ two *global* indices. The degree of progression is often ambiguous. The ambiguity - identified in the well-known article of Musgrave and Tun Thin (1948) - stems from different perceptions and various definitions employed in empirical research; i.e. various *local* and *global* measures for the degree of progression are compatible with a progressive tax system.[9] We calculated both the concentration index of taxes[10] and the income elasticity of the tax system.[11] A concentration index above zero and an elasticity above unity indicates a progressive tax system. Since tax progressivity is determined by both the rate structure and the tax base, changes in the degree of progression will result from changes in either aspect. The income tax elasticity increases by income-inelastic deductions, but will decline when deductions are very income-elastic. The intuitive

9 See Kiefer (1984), Formby, Smith and. Thistle (1990) and Caminada (1996) for details.

10 Kakwani (1977) generalized the concept of the Lorenz curve to study relationships among the distribution of different economic variables, e.g the concentration index of taxes or the Gini index of taxes (G). In this paper, we employ the formula for G, whereby G equals half the mean difference between tax liability pairs divided by the mean tax liability of N individual incomes (*cf.* Lambert, 1993, p.44).

11 Global income tax elasticity is defined as the aggregate weighted average of all individual income elasticities (weighted by their share in total tax liability). The aggregation method employed in securing a global estimate is a useful tool in our analysis because an attractive formula for liability progression can be used to identify relevant determinants. See Caminada and Goudswaard (1996) for details.

reasoning is quite simple. If deductions are income-elastic, pre-tax income growth causes a smaller increase in taxable income compared to the case that deductions are income-inelastic. Income-inelastic deductions, such as personal exemptions, imply a higher liability progression (Caminada and Goudswaard, 1996).
Using the sample data, we calculated (cross-sectional) an income tax revenue elasticity of 1.31 for the current system;[12] the concentration index of current tax system is 0.62.

4 The Simulated Flat Tax

The flat personal income tax base is simulated using data from CBS Income Panel Survey. Unfortunately, cross-section data have a time lag of several years. Therefore we used the survey data of the fiscal year 1990, while we made adjustments to imitate the situation for the year 1996.[13]
Under 'our' flat tax, a uniform proportional rate is levied on a broad personal income base, where only fixed personal exemptions are deductible from pre-tax incomes (Bentham's system). To derive the 'new' broad tax base, we eliminate almost all deductions for all taxpayers in the sample data.[14] See table 1. Pension insurance contributions paid by employees and employers and early pension insurance paid by employees are not included in the data. Therefore we distribute these contributions to the relevant socio economic groups using relevant computation rules.

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12 In earlier research we showed a sharp drop in elasticity of the Dutch wage and income tax (-17%), due to the tax reform in 1990 (Caminada and Goudswaard, 1996).

13 The personal exemption of 1996 is applied (in Dfl 1990), because this basic allowance increased substantially in real terms since 1990 (+28.6%). The number of taxpayers increased by 3.7%; so on aggregate the amount of personal exemptions increased by 31.1%. We assume the distribution of taxpayers by tarifgroups fixed. Secondly, we assume no significant alteration in the distributions of taxable income, after-tax income, deductions, and average tax ratios. This implies an equiproportionate growth of all incomes (almost 20% for 1990-1996). Such 'an equiproportionate growth' is an usual assumption in analyses of global progressivity, because the income distribution will not change by such an income growth (*cf.* Lambert, 1993). We do not expect bias in our results due to these assumptions, because global tax progressivity is rather low in the Netherlands (Caminada, 1996). Accordingly, it seems unlikely that the neglected change in tax progressivity 1990-1996 significantly affects the results .

14 On the other hand, the tax base is narrowed by the amount of a special taxable compensation allowance called OHT (= a transfer from employers to employees introduced in 1990). OHT is a curiosity in the Dutch tax system, and should be abolished in a simple system. On our request, CBS did leave out OHT in relevant data, that is in all parts of taxable income.

Table 1 summarizes the construction of such a broad tax base for 1990 (upper-right part of the table) and the adjustments made to imitate the situation for 1996 (dotted grey). Details on data and the actualizing-method used, are listed in the Appendix (see also notes 13-14). Since detailed data about the distribution of deductions are available, we are able to construct the new tax base for various income levels.

Table 1 From Taxable Income to Tax Base Flat Tax: Magnitude of Deductions

Tax Base 1990 * billion Dutch guilders		Simulated Base Flat Tax * billion Dfl	
1 taxable income[a]	305.0	taxable income flat tax (1+4)[a]	371.1
2 personal exemptions[b]	51.9	personal exemptions[b]	51.9
tax base (1-2)	253.0	tax base flat tax (1+4-2)	319.1
3 income tax revenue[c]	100.6	revenue neutral (ex ante)	100.6
4 deductions in 1990	66.1		
mortgage interest (cost of owner-occupied property)	15.7		
pension insurance contribution (employees + employer)[d]	15.7		
disability insurance contribution employees	8.8		
work-related expenses	7.2		
contributions for life insurance policy	4.1		
ins. contrib. for sickness and unemployment employees	3.8		
interest on consumptive credit	2.6		
deduction for self-employed	2.5		
deduction for exceptional (medical) costs	1.7		
retirement savings for self-employed	1.5		
early retirement scheme contribution employees[d]	0.9		
charitable gifts	0.7		
alimony payments	0.4		
deductible losses	0.4		
average rate (3/ (1-2))	39.8%	flat rate (3/ (1+4-2))	31.5%
2' personal exemption 1996 in billion Dfl of 1990	68.1	personal exemption 1996	68.1
		flat rate (3/ (1+4-2'))	33.2%

a excluding OHT (25.9 billion Dfl).

b personal exemptions are not included in the CBS-data (source: *Bouwstenennotitie* 1994, appendix 6.2): the total amount is equally distributed over all individuals with income (5.144 Dfl); this average is higher than the basic allowance in 1990 (4.568 Dfl) due to both the supplements for single parents and transfers from very low income earners to their partners.

c personal wage and income tax, including general social security contributions.

d source: *Statistical Yearbook*, CBS 1993, pp.292-294).

sources: *Dutch Personal Income Distribution 1990* (CBS 1993), *Bouwstenennotitie* (1994, appendix 6.2), *Statistical Yearbook* (CBS 1993, pp.292-294) and own calculations

As a result of the simulated base broadening, taxable income increases by 22%. Two-third of this expansion is caused by only three major deductions: mortgage interest, social insurance contributions paid by employees, and the pension insurance

contributions paid by employees and employers. Because of the simulated broader tax base, a revenue neutral uniform rate of 33.2% can be set (ex ante). Notice that this flat tax rate is surprisingly low, even compared to the regulatory rate in the first bracket of 37.5%.

It should be mentioned that there are various problems with the concept used. The tax base we constructed is a rather hybrid concept, which is for example far from the Haig-Simons definition of income (1938).[15] However, the paper focuses on real world tax reform, so we prefer actual taxable income as starting point of our analysis, rather than any theoretical income concept.

One could argue that the constructed system levies two-fold in several ways. For example, pension benefits remain to be taxed, while the deductibility of insurance contributions from gross earnings is eliminated. Secondly, we maintain taxes on rents from own housing (forfeiture), while the deduction for mortgage interest will be abolished.

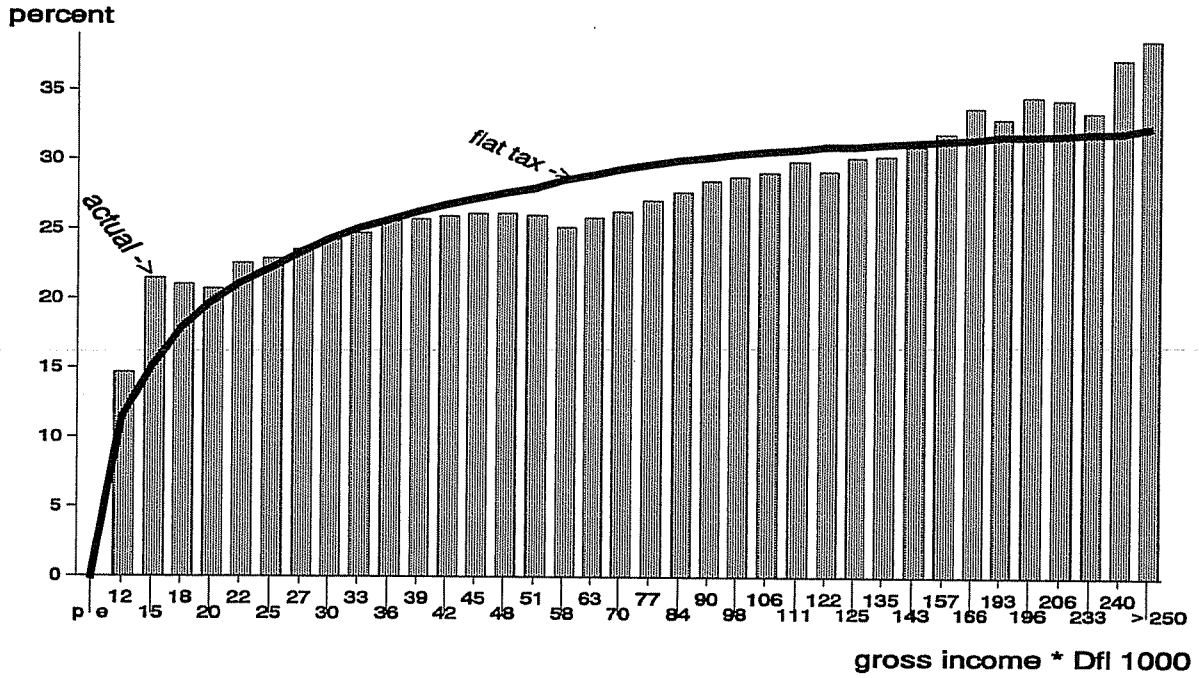
Another complication is that we do not include the corporation tax in our simulations. However, when the tax regime for self-employed would be altered, this would also require changes in the corporation tax, in order to prevent tax arbitrage.

5 Distributional Effects

Figure 2 shows the effect of the tax reform on the distribution of average tax ratios. The line illustrates the simulated flat rate tax, while the distribution of average tax ratios under the current system is represented by blocks. In both cases average tax liability by income class is related to the broad elaborated tax base: gross income (computed as current taxable income plus all applied deductions to be eliminated under a flat tax).

15 Income is defined as the amount an individual can consume in an given period of time without any reduction in wealth.

Figure 2 Comparison Average Tax Ratios Actual System 1996 and Simulated Flat Tax

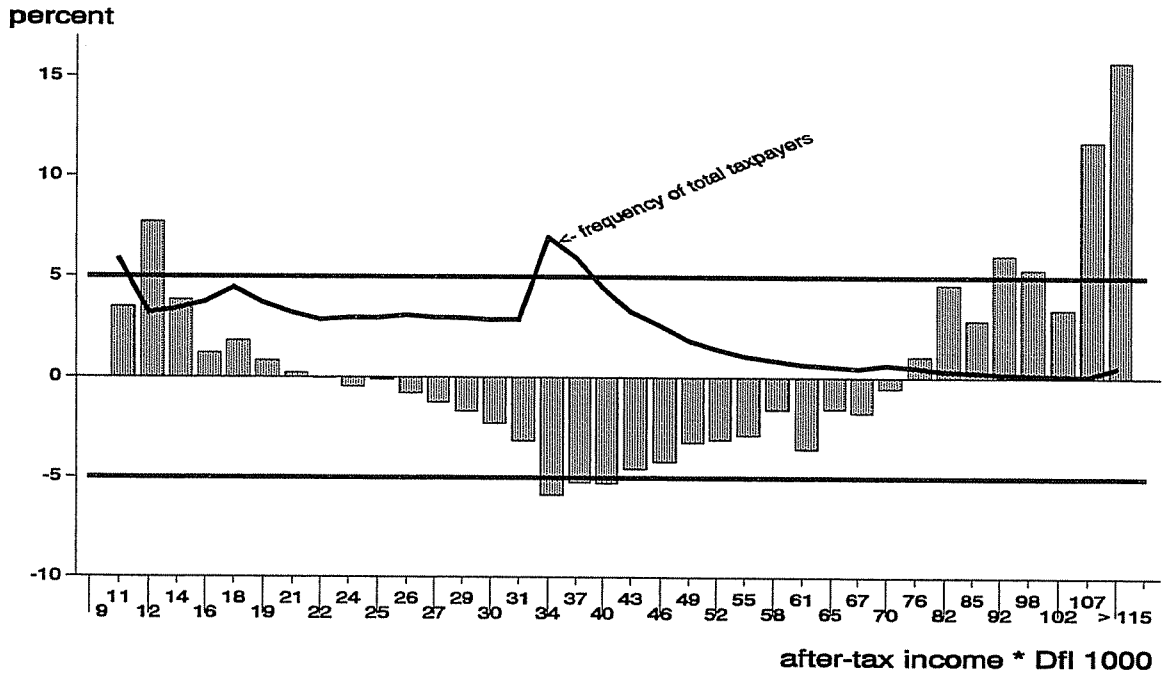


pe: personal exemption

several sources: see table 1

Changes in tax liabilities caused by the flat tax can also be illustrated as % of after-tax income (before the tax reform). Figure 3 presents the income effects of the flat tax.

Figure 3 Impact Flat Tax on After Tax Income (difference in percentage change)



several sources: see table 1

Very low income earners win.[16] The income effects around the minimumwage income level (23,000 Dfl after tax for a sole earner) are neglectable. A broad range of middle income earners lose: after-tax incomes decline 1% to 5% on average for the income classes between 25,000 Dfl and 75,000 Dfl. These losses for middle income groups could be problematic from a political point of view, but the size of the losses is limited in view of the radical reform. Very high income earners win. The positive income effect around 100,000 Dfl after-tax income is estimated to be 5%. Taxpayers in the highest income groups gain more than 5%, but their numbers are very small (see figure 3). Surprisingly, for the vast majority of the taxpayers, effects on after-tax income lie within a range of minus/plus 5%. The dramatic 'reform' would not involve dramatic changes in after-tax income. The range of minus/plus 5% for income effects was also used as a reference by two committees proposing on recent Dutch tax reform, and where considered as 'acceptable'.

We should, however, stress at this point that we derived averages by income class. The effect on after-tax income for individuals will undoubtedly show variation around these averages. Unfortunately, we are not able to show this diversity, because regulations on privacy do not allow the Dutch CBS to deliver more detailed data about deductions. When individual taxpayers are induced to make relatively more or less use of deductions compared to the average of an income class, income effects will be less negative respectively more positive.

The income effects also vary by socio-economic group. Main losers are those over 64 (-6.9%), because elderly are no longer taxed at a lower rate. The income effects for workers are small on average. Civil servants (-2.5%) and employees in the private sector (-1.0%) will face a modest loss. Civil servants lose more compared to employees, due to their higher deductions for pension contributions. The negative effect of losing deductions on after-tax income seems for these groups - on average - of greater value compared to the lower tax rate. For the self-employed both effects

16 Bias occurs (very positive effects) for income classes with a relatively high frequency of individuals with only part of the year income (low income earners). In practice, the personal exemption is partly deducted from pre-tax income by withholding the wage tax, i.e concurrent to period of working. When personal exemptions are not fully used (tax liability is higher than duty), individual taxpayers generally will ask restitution. In that case the restitution will take place in the next fiscal year. However, in our analysis of the flat tax, we simulate the full personal exemptions (whole year).

approximately compensate (-0.1%). Apparent winners are social security beneficiaries for unemployment (+7.3%), early pension (+7.8%) or disability (+2.3%). Their average use of deductions is relatively low (besides other causes).

Finally, we calculated global measures for the degree of tax progression. The computed income elasticity for the current tax system is 1.31 (cross-sectional), while the income elasticity of the flat personal income tax still would be 1.22. Current income tax progression (0.31) is mainly caused by the fixed personal exemptions (0.22)[17] - which are maintained in the simulated flat rate tax. The overall drop of 0.09 or 7% is relatively modest compared to the change in income elasticity due to the tax reform in 1990 (-17%; see section 3). Also the concentration index of taxes indicates a modest decline in progressivity (from 0.62 till 0.56).[18]

Table 2 summarizes the effects by socio-economic group.

Table 2 Effect Flat Tax: Averages Social Groups 1996

	individuals with pre-tax income * 1.000	percentage change			level		level	
		tax base	tax liability	after-tax income	income tax elasticity actual	income tax elasticity flat tax	concentration index taxes actual	concentration index taxes flat tax
self-employed	476	35.1	0.1	-0.1	1.54	1.12	0.30	0.27
civil servants	629	29.2	4.7	-2.5	1.27	1.13	0.20	0.20
employees[a]	4.463	26.2	1.9	-1.0	1.29	1.16	0.43	0.44
early retirees[b]	390	7.4	-15.5	7.8	1.27	1.21	0.16	0.23
disabled	445	11.3	-5.7	2.3	1.30	1.29	0.17	0.19
old-age pension	1.667	3.8	31.9	-6.9	1.62	1.39	0.89	0.57
unemployed	395	6.0	-21.0	7.3	1.23	1.57	0.22	0.26
total/average[c]	9.902	21.7	0.0	0.0	1.31[d]	1.22[d]	0.62[e]	0.56[e]

a including chief executives of firms (in Dutch: directeuren NV/BV).
b individuals with pension income younger than 65 years of age.
c including the socio-economic groups social welfare recipients and otherwise.
d weighted average of income elasticities of tax revenue, i.e. weighted by their share in total tax revenue.
e the Gini index of pre-tax income equals 0.45; so the concurrent Kakwani index yields 0.17 respect. 0.11.

several sources: see table 1 and the Appendix

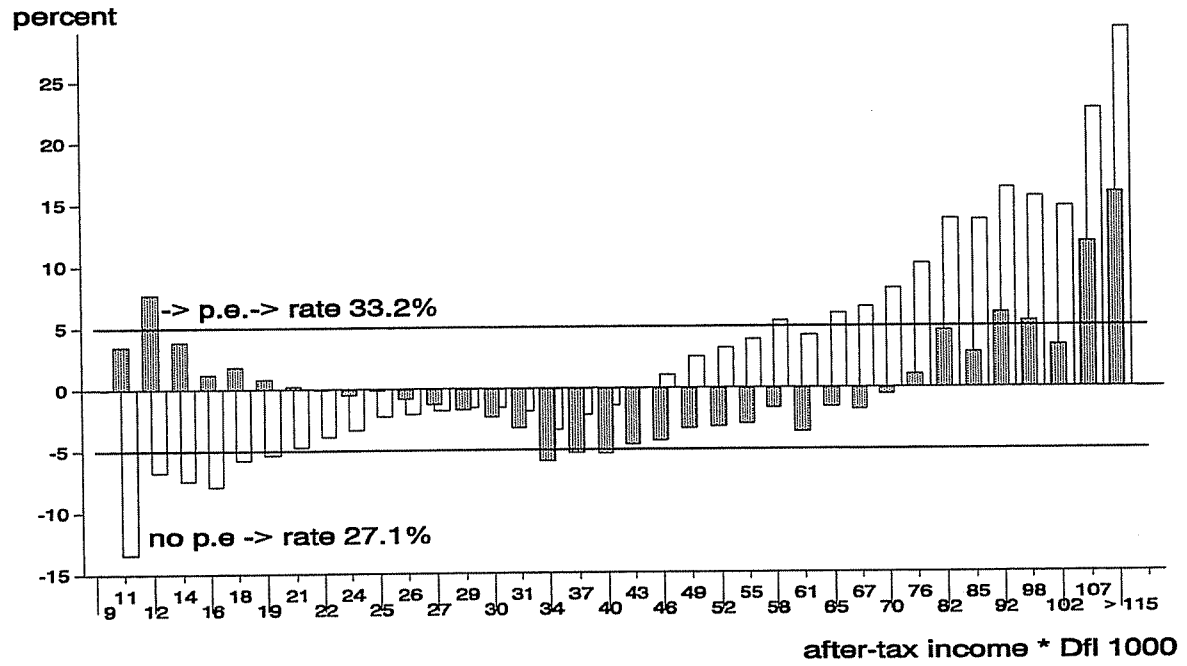
17 As in many other OECD countries. Following Owens (1997, p.11): 'Most of the progressivity of the income tax derives from the fact that the first slice of income is free of tax'.

18 Kakwani (1977, p.723) showed how a change in the tax schedule, holding pre-tax income distribution fixed, affects the redistributive effect of taxation: 'If there are two tax functions yielding the same average tax rate, the tax function with the uniformly higher tax elasticity will give the post-tax income distribution more equal than the tax function with lower tax elasticity'. This theorem can *not* be applied for the different socio-economic groups, although the flat tax reform is revenue neutral as a whole.

No Personal Exemptions

One could argue that the personal exemptions should be eliminated as well to derive further simplicity of the tax system. We did additional simulations to show the effects. As a result of the additional base broadening, a rate of 27.1% would balance the budget (ex ante). However, the effects on after-tax income would be substantial and would exceed the range of minus/plus 5% for the majority of the taxpayers. Main losers are very low income earners, while very high income earners would win most (even more compared to the Bentham variant of the flat tax). On the other hand, middle income groups would face smaller income changes in this variant. In a flat rate system with no exemptions and deductions, income tax progression would of course become zero.[19] Figure 4 presents the income effects of the flat personal income tax, with a fixed personal exemption (grey blocks) and without a fixed personal exemption (white blocks).

Figure 4 Impact Flat Tax on After Tax Income (difference in percentage change)



several sources: see table 1 and the Appendix

19 Both calculated global measures for the degree of tax progression indicate a significant decline: the income tax elasticity falls from 1.31 till 1.00 and the concentration index of taxes drops from 0.62 till 0.45 (which equals the Gini index of pre-tax income).

6 Conclusions

In this paper, we simulated a simple broad base/flat rate personal income tax system and we compare the distribution of the current personal income tax including social contributions in the Netherlands to the distribution of the simulated flat rate tax. Using extensive income panel data, we simulated the effects on personal incomes of an elimination of almost all deductions in exchange for a reduction in tax rates, sufficient to keep personal income tax revenue constant at the initial level and distribution of pre-tax incomes. In the system we constructed, a uniform proportional rate is levied on a very broad personal income base, where only fixed personal exemptions are deductible from pre-tax income.

Our simulations indicate that:

- The redistributive effect of the current rate structure of Dutch tax system (marginal rates of 37.5%, 50% and 60%) is substantially diminished by deductions. Deductions appear to be income-elastic: the deduction ratio grows sharply with gross income.
- After the simulated base broadening, a proportional rate of 33.2% balances the budget (ex ante). Such a flat rate causes only relatively small changes in the distribution of average tax ratios. For the majority of the taxpayers, the effect on after-tax income lie within a range of minus/plus 5%.
- Liability progression is mainly caused by the fixed personal exemption, which was maintained in the simulated flat rate tax. We calculated an income elasticity of 1.31 for the current tax system, while the income elasticity of the simulated flat personal income tax still would be 1.22 (-7%). Also the concentration index of taxes indicates a modest decline in tax progressivity (from 0.62 till 0.56).

We should, however, mention some limitations of the analysis:

- The tax base we constructed is simply derived by drastic broadening of the tax base of the current system. It does not have any theoretical foundation.
- The elimination of large deductions will probably have serious economic consequences associated with behaviourial responses, for instance with regard to savings.
- A drastic reform such as envisaged would involve a rather long transition period, partly because of timing and capitalization problems.

In addition to these limitations, one could argue that discussions of the tax base should be kept separate from discussions of the rate structure. A comprehensive tax base does not imply that a flat rate should be chosen. This is of course true, but we merged these issues just to show that a radical tax reform does not necessarily entail large distributional effects, not even when a flat rate is introduced.

We conclude that the income effects of the broad base/flat rate personal income tax would be relatively small given the scope of the operation. From a distributional point of view, the idea of a flat tax can be taken seriously in debates on tax reform.

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Appendix Data and Construction Taxable Income Flat Rate Tax 1990 (1996)

On our request the Dutch Central Bureau of Statistics (CBS) has delivered various tables, which are generated from the *Personal Income Distribution 1990*. These data contain the distribution of incomes (pre-tax, taxable and after-tax), the distribution of tax liabilities and almost all deductions for the following socio-economic groups: self-employed, civil servants, employees in the private sector, social security beneficiaries (unemployed and disabled), pension earners (oldage and early retirees), and social welfare recipients. CBS administers the income distribution in 43 intervals, but some of them are empty. Distributions are ranked by 'gross total income' (definition CBS) for each item. This income concept *can* be used as scale-variable for calculating average tax ratios, i.e. as proxy for a non-eroded tax base. However, a statistical bias will occur when the - distribution of - average tax ratios of socio-economic groups is compared.[20] Therefore we define a broad comparable income-concept: gross income.
Under 'our' flat tax, a uniform proportional rate is levied on a broad personal income base, where only fixed personal exemptions are deductible from gross incomes. Since very detailed data about deductions are available, we are able to construct the tax base of a flat personal income tax. Gross income is computed as current taxable income plus all applied deductions to be eliminated under such a flat tax.

Table 1 in the main text summarizes the construction of such a broad tax base for 1990 and the adjustments made to imitate the situation for 1996. One could argue that the simulation results are biased because of the adjustments made to imitate the situation for 1996 with 1990-data. Three elements are relevant:

- It seems unlikely that the distribution of incomes did not change. However, the effect of growth of pre-tax incomes on tax progressivity, or on the redistributive effect of taxes, is inherently ambiguous for real world taxes (Lambert and Pfähler, 1992). Neglecting these changes certainly affects the *specific figures* of the empirical analysis for 1996. Moreover, fiscal policy of the last years in the Netherlands focused on a reduction of the tax ratio for working poor, i.e. various expansions of both the deduction for cost of working and the fixed personal exemption were implemented. As a result tax progressivity was significantly enhanced (Caminada, 1996). Tax progressivity increased for an other reason as well: the automatic correction for inflation was not systematically applied.
- On the other hand, the *level* of tax progressivity appears to be rather low in the Netherlands (Caminada, 1996). Accordingly, it seems unlikely that the neglected *change* in tax progressivity 1990-1996 significantly affects the *main* results:

20 Tax liability ratio is determined by both the rate structure and the tax base (deductions). For example, pension insurance contributions and wage-related insurance contributions against income-loss for employees in the private sector are subtracted, while comparable payments for self-employed still are included in 'gross total income'. Accordingly, tax ratios for self-employed will be lower compared to tax ratios for employees (given the amount of tax liability).

a progression in the current tax system results from the rate structure, but is neutralised almost completely by the effect of deductions; and *b* tax progressivity is mainly caused by the fixed personal exemption, which was maintained in the simulated flat rate tax.

- Finally should be noted that most other assumptions about the base projection for 1996 seems in line with actual figures presented by the Treasury (see table A1). Table A1 illustrates the almost similar development of pre-tax income (+19%) and taxable income (+16%) during 1990-1995. However, the tax base increased less rapidly (+12%). Only a minor part of this difference is caused by the sharp expansion of deductions, while the growth of personal exemptions has had a large effect (and is therefore incorporated in our flat tax simulation for 1996).

Table A1 Development Pre-Tax Income, Deductions, and Tax Base 1990-1995

	1990	1991	1992	1993	1994	1995	change 90-95
1 pre-tax income[a]	383	406	432	436	444	456	19%
2 deductions[b]	41	43	47	48	55	59	45%
3 taxable income (1-2)	341	364	385	389	390	398	16%
4 personal exemptions	52	54	60	67	70	72	39%
tax base (3-4=1-2-4)	289	311	325	322	320	325	12%

a wage income, capital income, interest and dividend, rent own houses, (including deductions for employees contributions, OHT, pension insurance contributions and early retirement scheme contributions).

b deductions for work-related expenses, self-employed, contributions for life insurance policy, mortgage interest, interest consumptive credit, exceptional (medical) costs, and, other deductions.

source: Miljoenennota 1997, p.97; all figures, except for those in the last column, are in billion of Dfl

Since the most important fiscal policy measures in the recent years are taken in to account in our empirical exercise, we expect little bias in the calculations using the actualizing-method as described in section 4. A conclusive judgment, however, can only be made as data from the *Dutch Personal Income Distribution 1996* will become available.

Table A2 below illustrates the income effects for socio-economic groups (1990).

The required data about several distributions are summarized in the following tables:[21]

A3 the number of persons with gross total income (definition CBS);
A4 personal wage and income tax, including general social security contributions;
A5 taxable income;
A6 applied deductions, an aggregated table of 18 deductions;
A7 gross income (tax base flat tax): computed as taxable income (A5) combined with all applied deductions to be eliminated under a flat tax (A6); and
A8 disposable income or after-tax income.

21 The underlying data used in this paper are available upon request from the authors. All errors are ours.

Table A2 Construction Taxable Income and Income Effects of Flat Rate Personal Income Tax by Socio-economic Groups 1990

	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
Number of persons with pre-tax income * 1000	476	629	4463	395	445	1667	390	1436	9902
Idem, with pre-tax income > fixed personal exemption	422	629	4255	383	437	1661	368	695	8850
Amount * million Dutch guilders									
a after-tax income	18966	19396	113821	5606	9170	33719	9904	9856	223645
b taxable income[a]	21762	28543	169118	6903	11977	38646	14258	10167	304986
c deductions	7676	8329	44461	415	1358	1633	1061	1002	66062
work-related expenses	217	1007	5193	89	58	80	82	423	7178
mortgage interest	1377	2220	10637	87	334	441	464	126	15714
sickness insurance contribution employees	6	3	1437	22	105		7	59	1639
disability insurance contribution employees	9	20	8207	60	283		42	167	8790
unemployment ins. contribution employees	8	4	1886	30	136		9	82	2156
contributions for life insurance policy	1172	216	1544	25	64	72	133	25	3262
idem	563	4	239		7	1	4	8	828
idem	11	3	11		1	4		1	31
alimony payments	44	33	208	2	9	69	32	5	402
exceptional (medical) costs	143	126	647	40	144	434	86	57	1692
retirement savings for self-employed (added)	1534	6	29	2	5		4	1	1581
retirement savings for self-employed (subtract)	-45					-16			-45
interest on consumptive credit	204	250	1622	21	96	301	94	32	2633
charitable gifts	57	71	265	6	17	227	56	7	708
deduction for self-employed	2161	24	194	27	78		37	1	2525
deductible losses	216	4	73	6	22	20	10	9	364
(early) retirement scheme contribution		4338	12267						16605
b+c taxable income flat tax (simulation)[a]	29438	36872	213578	7317	13334	40278	15319	11503	371048
Impact broad base/flat rate tax on after-tax income[g]									
no personal exemptions									
revenue equivalent flat rate (ex ante) -> 27.1%	+3.8%	+1.8%	+1.7%	-0.5%	+0.2%	-10.7%	+8.4%	-1.6%	0.0%
personal exemptions 1990									
revenue equivalent flat rate (ex ante) -> 31.5%	+1.0%	-1.3%	-0.2%	+5.1%	+1.7%	-7.9%	+8.0%	+16.8%	0.0%
personal exemptions 1996 in Dfl 1990									
revenue equivalent flat rate (ex ante) -> 33.2%	-0.1%	-2.5%	-1.0%	+7.3%	+2.3%	-6.9%	+7.8%	+23.9%	0.0%

a excluding OHT: a taxable compensation allowance introduced in 1990.
b including chief executives of firms (in Dutch: directeuren NV/BV).
c of social securities for ...
d individuals with pension income younger than 65 years of age.
e individuals with gross income, earned in a less than 52 weeks.
f including the socio-economic groups social welfare recipients and otherwise.
g change in tax liabilities as percentage of after-tax income (groups' averages).

sources: *Dutch Personal Income Distribution 1990* (CBS 1993), *Bouwstenennotitie* (1994, appendix 6.2), *Statistical Yearbook* (CBS 1993, pp.292-294) and own calculations

1 $US = 1.82 Dfl (average 1990)

Table A3 Number of persons with gross total income (definition CBS) * 1000 [a]

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	19		5					24	54
> 0 - 2	14		66	2	2	3	11	386	490
2 - 4	11		68	3	1		7	167	267
4 - 6	9		69	7	5	3	5	163	266
6 - 8	7	3	84	8	6	3	4	163	280
8 - 10	7	2	91	10	6	8	5	123	257
10 - 12	8	3	89	20	8	374	5	76	588
12 - 14	7	4	97	67	10	64	4	62	322
14 - 16	7	6	108	44	7	116	5	43	344
16 - 18	9	7	113	40	8	155	6	31	379
18 - 20	8	9	109	65	45	155	11	28	449
20 - 22	8	9	111	35	27	130	15	20	373
22 - 24	7	10	113	17	24	105	16	20	324
24 - 26	10	11	109	11	22	78	15	16	289
26 - 28	10	10	118	12	35	64	15	16	299
28 - 30	8	15	135	11	38	48	15	13	300
30 - 32	11	19	152	7	36	41	24	11	312
32 - 34	10	25	160	5	28	37	20	9	301
34 - 36	10	26	168	5	26	29	22	8	298
36 - 38	9	30	173	4	20	26	19	7	290
38 - 40	9	40	180	3	14	23	16	5	292
40 - 45	25	93	456	6	28	44	35	12	701
45 - 50	23	79	403	4	18	36	26	8	600
50 - 55	22	60	306	2	10	24	19	6	451
55 - 60	22	43	221	2	7	19	14	4	331
60 - 65	20	34	172		3	15	11	2	259
65 - 70	17	23	120		3	11	10	2	187
70 - 75	16	17	91	2	2	9	6	1	143
75 - 80	12	13	67	2		7	6	1	107
80 - 85	11	10	53		2	7	5	1	88
85 - 90	11	7	40			4	3		66
90 - 95	10	5	32			5	3	1	56
95 - 100	8	3	28			3	2	1	46
100 - 110	14	5	38			4	3	1	64
110 - 120	12	3	30		3	3		1	52
120 - 130	9	2	16			3	3		33
130 - 140	8		16			2			28
140 - 150	5	2	10						18
150 - 160	5		8			2	3		16
160 - 170	4	3	6						13
170 - 180	3		5			2			10
180 - 190	3		3						7
190 - 200	2		4						7
200 and over	15		19			4			39
total	476	629	4463	395	445	1667	390	1436	10097

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
b including chief executives of firms (in Dutch: directeuren NV/BV).
c of social securities for ...
d individuals with pension income younger than 65 years of age.
e individuals with gross income, earned in a less than 52 weeks.
f including the socio-economic groups social welfare recipients and otherwise.

sources: *Dutch Personal Income Distribution 1990* (CBS, 1993) 1 $US = 1.82 Dfl (average 1990)

Table A4 Personal wage and income tax, including general social security contributions * million Dfl [a]

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	18		3					2	32
> 0 - 2	2		15	1	2	3	3	47	69
2 - 4	5		42	4	1	4	4	78	136
4 - 6	6		45	6	4		4	78	149
6 - 8	8	4	80	9	7	1	4	107	218
8 - 10	10	4	134	20	11	8	6	139	335
10 - 12	19	8	194	52	18	445	8	140	891
12 - 14	16	13	291	219	28	94	12	167	857
14 - 16	22	26	411	165	27	216	17	149	1060
16 - 18	22	33	525	166	35	333	27	131	1309
18 - 20	32	50	589	311	240	377	59	141	1882
20 - 22	29	55	680	181	147	368	88	117	1748
22 - 24	30	69	773	91	144	330	103	126	1731
24 - 26	50	83	824	68	149	271	104	111	1757
26 - 28	62	88	966	79	258	244	117	118	2036
28 - 30	46	137	1185	76	283	204	126	105	2273
30 - 32	66	191	1424	57	282	189	218	99	2593
32 - 34	61	268	1604	47	238	188	194	83	2722
34 - 36	75	298	1772	44	235	164	225	76	2921
36 - 38	69	355	1924	38	189	148	215	78	3028
38 - 40	69	497	2081	29	143	144	192	59	3240
40 - 45	234	1256	5702	75	318	308	466	155	8538
45 - 50	244	1194	5572	61	235	297	399	113	8136
50 - 55	267	1036	4712	34	155	233	338	100	6898
55 - 60	300	844	3848	36	112	238	279	64	5731
60 - 65	295	760	3372		65	220	242	41	5021
65 - 70	276	562	2615		55	198	239	54	4012
70 - 75	280	445	2213	35	41	169	173	30	3365
75 - 80	234	377	1752	52		147	174	40	2761
80 - 85	241	324	1519		48	157	140	21	2440
85 - 90	250	239	1243			120	87	8	1973
90 - 95	255	182	1050			141	101	30	1772
95 - 100	221	115	1017			95	71	23	1561
100 - 110	411	192	1469			146	114	29	2374
110 - 120	420	155	1325		167	141		26	2163
120 - 130	365	105	812			133	173	16	1564
130 - 140	326	0	922			101		14	1503
140 - 150	257	132	618					5	1016
150 - 160	271		496			109	266	16	921
160 - 170	239	251	430						815
170 - 180	227		371			133		10	718
180 - 190	188		239					2	543
190 - 200	149		326						567
200 and over	2022		2607			458			5248
total	8689	10346	59789	1954	3638	7273	4989	2946	100626

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
b including chief executives of firms (in Dutch: directeuren NV/BV).
c of social securities for ...
d individuals with pension income younger than 65 years of age.
e individuals with gross income, earned in a less than 52 weeks.
f including the socio-economic groups social welfare recipients and otherwise.

sources: *Dutch Personal Income Distribution 1990* (CBS, 1993)

1 $US = 1.82 Dfl (average 1990)

Table A5 Taxable income * million Dfl [a]

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	-682	-2	-125	-15	-45	-69	-11	-29	-1011
> 0 - 2	-4		63		1	1	5	223	292
2 - 4	19		198	8	6	10	17	277	553
4 - 6	24	1	279	33	23	7	21	381	785
6 - 8	5	9	471	48	40	16	25	490	1122
8 - 10	20	17	645	84	54	66	34	597	1542
10 - 12	54	26	816	205	82	3986	37	569	5824
12 - 14	44	48	1131	832	127	759	47	631	3695
14 - 16	51	88	1490	617	99	1629	67	531	4690
16 - 18	79	112	1822	610	143	2409	86	461	5892
18 - 20	94	168	1977	1142	831	2643	208	489	7857
20 - 22	90	178	2214	652	515	2456	302	393	7126
22 - 24	91	216	2474	331	491	2192	342	416	6809
24 - 26	147	259	2608	239	505	1789	337	373	6634
26 - 28	175	273	3025	278	882	1652	382	385	7447
28 - 30	137	424	3679	267	1003	1304	400	331	7971
30 - 32	222	584	4397	188	973	1224	692	314	8846
32 - 34	199	806	4896	156	814	1144	630	263	9043
34 - 36	236	893	5417	148	795	978	718	251	9544
36 - 38	234	1064	5847	121	620	885	671	247	9739
38 - 40	220	1504	6330	93	474	844	603	188	10333
40 - 45	724	3790	18343	247	1017	1761	1413	475	27852
45 - 50	800	3536	16803	183	726	1629	1152	346	25238
50 - 55	893	2946	13877	100	474	1147	959	298	20770
55 - 60	914	2282	10875	105	324	1042	770	189	16532
60 - 65	877	2002	9213	63	192	857	641	113	13971
65 - 70	826	1439	6886	14	156	705	614	143	10803
70 - 75	823	1119	5657	28	150	584	426	84	8881
75 - 80	675	926	4470	23	55	491	440	103	7199
80 - 85	664	787	3752	21	72	507	346	61	6223
85 - 90	670	569	3167	13	29	366	274	25	5135
90 - 95	678	426	2586	11	20	449	241	79	4492
95 - 100	565	273	2513	14	24	268	169	56	3891
100 - 110	1136	439	3459		41	436	268	71	5849
110 - 120	1055	340	3040	6	61	375	142	71	5103
120 - 130	869	223	1809	17	28	339	234	36	3561
130 - 140	931	153	2024	12	21	245	92	45	3549
140 - 150	585	126	1331	9		111	51	11	2225
150 - 160	612	56	1077			151	97	48	2042
160 - 170	565	109	989		14	162	27		1867
170 - 180	486	53	743		14	129	36	35	1497
180 - 190	393	67	494		38	86	10	65	1175
190 - 200	308	28	662		16	207	27		1247
200 and over	4256	182	5694		75	671	217	30	11147
total	21762	28543	169118	6903	11977	38646	14258	10167	304986

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
b including chief executives of firms (in Dutch: directeuren NV/BV).
c of social securities for ...
d individuals with pension income younger than 65 years of age.
e individuals with gross income, earned in a less than 52 weeks.
f including the socio-economic groups social welfare recipients and otherwise.

sources: *Dutch Personal Income Distribution 1990* (CBS, 1993) 1 $US = 1.82 Dfl (average 1990)

Table A6 Applied deductions * million Dfl[a] : table 1 in the main text contains a specification

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	179	0	60	4	22	9	4	20	312
> 0 - 2	37	0	32	1	7	4	1	91	180
2 - 4	27	2	37	3	1	0	1	42	114
4 - 6	32	0	39	3	1	0	1	50	127
6 - 8	51	2	54	5	4	2	2	56	177
8 - 10	38	2	64	7	5	7	3	64	193
10 - 12	51	5	86	12	7	14	3	56	237
12 - 14	53	13	103	13	7	29	2	64	288
14 - 16	54	16	140	19	7	47	4	56	345
16 - 18	69	18	170	22	17	64	6	50	418
18 - 20	74	27	182	19	40	77	7	46	482
20 - 22	82	34	206	22	36	67	10	42	505
22 - 24	65	34	253	22	46	62	19	43	550
24 - 26	99	53	283	11	49	57	18	38	615
26 - 28	104	58	396	17	68	59	22	50	778
28 - 30	74	89	536	20	83	40	24	40	913
30 - 32	119	134	738	15	99	45	33	36	1223
32 - 34	106	182	899	14	97	65	31	37	1437
34 - 36	108	217	1078	17	84	41	33	39	1626
36 - 38	108	262	1254	14	76	43	35	34	1830
38 - 40	112	401	1450	10	57	35	29	23	2120
40 - 45	303	999	4372	27	136	81	79	63	6066
45 - 50	308	1034	4532	30	129	67	73	62	6242
50 - 55	289	867	4025	18	70	62	74	47	5457
55 - 60	311	696	3354	17	56	67	58	38	4601
60 - 65	352	622	2992	11	37	46	77	18	4155
65 - 70	330	467	2315	3	30	40	67	21	3277
70 - 75	309	410	1937	10	21	56	40	13	2797
75 - 80	240	329	1600	3	14	27	41	12	2268
80 - 85	232	291	1307	3	9	31	41	8	1922
85 - 90	243	204	1101	5	5	26	25	5	1617
90 - 95	217	167	906	3	3	21	28	20	1365
95 - 100	202	120	873	2	3	17	23	10	1251
100 - 110	339	175	1204	0	3	24	39	7	1792
110 - 120	315	134	1135	2	7	31	22	7	1653
120 - 130	246	98	654	5	3	23	17	7	1056
130 - 140	233	26	686	2	3	26	15	5	995
140 - 150	187	43	460	2	0	6	1	4	704
150 - 160	191	9	401	0	0	11	14	3	629
160 - 170	182	33	328	0	1	14	2	0	561
170 - 180	123	13	273	0	1	5	2	3	419
180 - 190	94	7	188	0	6	1	4	2	302
190 - 200	91	5	202	0	1	8	5	0	312
200 and over	662	30	1434	0	7	28	24	1	2186
total	7638	8329	44461	415	1358	1633	1061	1002	66062

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
b including chief executives of firms (in Dutch: directeuren NV/BV).
c of social securities for ...
d individuals with pension income younger than 65 years of age.
e individuals with gross income, earned in a less than 52 weeks.
f including the socio-economic groups social welfare recipients and otherwise.

sources: *Dutch Personal Income Distribution 1990* (CBS, 1993), *Statistical Yearbook* (CBS, 1993, pp.292-294) and own calculations

1 $US = 1.82 Dfl (average 1990)

Table A7 Taxable income flat tax * million Dfl [a] = taxable income (A5) + applied deductions (A6)

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	-503	-1	-65	-11	-23	-60	-7	-9	-698
> 0 - 2	33	0	94	1	8	5	7	314	472
2 - 4	46	2	235	12	6	10	17	319	666
4 - 6	55	2	318	36	24	7	21	432	912
6 - 8	56	10	525	53	44	18	27	547	1299
8 - 10	58	20	710	91	59	73	37	660	1735
10 - 12	105	31	902	218	89	4000	40	625	6061
12 - 14	97	61	1234	845	134	788	49	696	3983
14 - 16	105	104	1630	636	106	1676	71	587	5035
16 - 18	148	130	1991	632	160	2473	92	511	6310
18 - 20	168	196	2159	1161	870	2720	215	535	8338
20 - 22	171	212	2420	674	551	2523	312	435	7631
22 - 24	156	250	2727	352	536	2254	361	460	7359
24 - 26	246	311	2891	250	555	1847	354	411	7249
26 - 28	280	331	3421	295	950	1710	404	435	8225
28 - 30	211	513	4215	288	1086	1344	424	371	8884
30 - 32	341	718	5135	203	1071	1270	725	350	10069
32 - 34	305	989	5795	171	911	1210	662	300	10479
34 - 36	343	1109	6495	165	879	1020	751	290	11170
36 - 38	342	1326	7101	135	696	928	706	281	11569
38 - 40	332	1905	7780	102	531	879	633	210	12453
40 - 45	1027	4790	22715	274	1153	1842	1492	538	33918
45 - 50	1107	4569	21335	214	856	1696	1224	408	31480
50 - 55	1182	3813	17902	118	544	1208	1033	344	26226
55 - 60	1225	2978	14229	122	380	1109	829	227	21134
60 - 65	1229	2623	12205	73	229	903	718	131	18126
65 - 70	1156	1906	9201	17	186	746	681	164	14079
70 - 75	1132	1528	7594	38	170	641	466	97	11678
75 - 80	915	1256	6070	27	69	517	481	115	9467
80 - 85	897	1078	5059	24	81	538	387	70	8146
85 - 90	913	773	4268	19	34	391	299	30	6752
90 - 95	895	593	3492	15	23	471	270	99	5857
95 - 100	768	394	3386	16	26	286	192	66	5142
100 - 110	1475	614	4663	0	43	461	306	77	7641
110 - 120	1370	474	4175	8	68	406	164	78	6756
120 - 130	1115	321	2463	21	31	362	250	42	4617
130 - 140	1164	179	2710	14	24	271	106	50	4545
140 - 150	772	169	1791	11	0	118	52	15	2929
150 - 160	803	66	1478	0	0	162	111	52	2671
160 - 170	748	142	1318	0	15	176	29	0	2428
170 - 180	609	66	1016	0	14	134	38	38	1916
180 - 190	486	73	682	0	44	87	14	68	1477
190 - 200	399	32	864	0	17	215	31	0	1559
200 and over	4918	213	7128	0	81	699	241	32	13333
total	29438	36872	213578	7317	13334	40278	15319	11503	371048

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
b including chief executives of firms (in Dutch: directeuren NV/BV).
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d individuals with pension income younger than 65 years of age.
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sources: *Dutch Personal Income Distribution 1990* (CBS, 1993), *Statistical Yearbook* (CBS, 1993, pp.292-294) and own calculations

1 $US = 1.82 Dfl (average 1990)

Table A8 Disposable income or after-tax income * million Dfl [a]

income class * 1000 Dfl	self-employed	civil servants	employees[b]	recipients[c] unemployed	recipients[c] disabled	retirees over 65	early retirees[d]	part of year[e]	total[f]
negative or 0	-554	-4	-95	-10	-31	-61	-4	-26	-811
> 0 - 2	10	0	52	1	1	0	8	239	314
2 - 4	29	1	158	7	3	2	16	421	659
4 - 6	42	2	278	31	23	7	23	723	1149
6 - 8	40	7	502	45	32	17	27	1034	1728
8 - 10	53	15	671	74	45	64	41	960	1952
10 - 12	70	22	772	171	72	3717	45	688	5604
12 - 14	84	37	948	656	98	742	46	631	3309
14 - 16	88	65	1174	509	81	1565	56	478	4118
16 - 18	128	82	1351	521	101	2301	70	392	5088
18 - 20	133	120	1433	921	623	2566	159	382	6587
20 - 22	142	124	1590	553	409	2356	237	302	6008
22 - 24	129	152	1765	295	387	2070	274	311	5619
24 - 26	201	180	1842	198	390	1683	262	288	5383
26 - 28	229	191	2116	240	678	1483	289	293	5876
28 - 30	182	296	2568	227	776	1190	304	246	6197
30 - 32	283	404	3063	157	782	1073	514	228	6757
32 - 34	256	557	3400	125	657	1040	471	186	6827
34 - 36	272	612	3767	118	638	861	536	184	7091
36 - 38	278	732	4077	94	494	795	489	179	7182
38 - 40	273	1055	4447	72	358	750	439	137	7592
40 - 45	821	2650	12209	179	773	1549	1017	335	19596
45 - 50	847	2514	12008	133	557	1401	812	240	18559
50 - 55	865	2066	9884	73	347	966	661	211	15128
55 - 60	923	1564	7617	73	239	846	511	134	11930
60 - 65	905	1346	6253	41	132	678	427	77	9868
65 - 70	782	956	4642	10	109	551	396	95	7552
70 - 75	811	736	3757	18	88	428	266	59	6171
75 - 80	640	605	2919	14	38	357	274	64	4916
80 - 85	650	505	2413	12	48	362	217	42	4257
85 - 90	639	347	1938	8	20	257	130	13	3366
90 - 95	618	265	1635	10	12	301	146	52	3038
95 - 100	527	174	1501	8	16	180	98	35	2542
100 - 110	912	273	2060	0	28	266	162	43	3745
110 - 120	894	202	1789	4	39	232	83	37	3287
120 - 130	722	127	1066	8	18	200	119	20	2285
130 - 140	618	90	1035	6	12	140	49	35	1996
140 - 150	457	69	749	5	0	63	26	4	1373
150 - 160	481	34	593	0	0	79	50	32	1270
160 - 170	411	59	493	0	8	81	14	0	1067
170 - 180	344	29	395	0	7	58	18	26	877
180 - 190	279	31	272	0	16	44	9	7	670
190 - 200	225	14	369	0	8	62	12	0	690
200 and over	2227	90	2347	0	39	395	105	19	5233
total	18966	19396	113821	5606	9170	33719	9904	9856	223645

a the CBS administers income distributions in intervals of 'gross total income' (excluding the transfer from employers to employees (in Dutch: OHT): a taxable compensation allowance introduced in 1990).
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sources: *Dutch Personal Income Distribution 1990* (CBS, 1993) 1 $US = 1.82 Dfl (average 1990)

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