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ACCOUNTING FOR BUSINESS INCOME IN MEASURING TOP INCOME SHARES:
INTEGRATED ACCRUAL APPROACH USING INDIVIDUAL AND FIRM DATA FROM NORWAY

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Accounting for Business Income in Measuring Top Income Shares: Integrated Accrual Approach
Using Individual and Firm Data from Norway

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ABSTRACT

Business income is important in the upper tail of the personal income distribution, but the extent to which it is captured by measures of personal income varies substantially across tax regimes. Using linked individual and firm data from Norway, we are able to attribute business income to personal owners as it accrues rather than when it is realized. This adjustment leads to an increase in top income shares, and the size of this effect varies dramatically depending on the tax regime in place. After a tax reform in 2005 that created strong incentives to retain earnings within businesses, the increase was massive: accounting for earnings retained in the corporate sector leads to more than doubling of the share of income of top 0.1% in some years. Furthermore, adjusting for retained earnings stabilizes the composition of the top income group before and after the reform. We also show that the response is driven by majority owners in closely held firms and facilitated through indirect ownership. As the result, traditional measures of top income shares become misleadingly low (even when accounting for capital gains). We speculate on the implications of our findings for levels and trends in top income shares observed in other countries. In particular, we note that the major tax reforms of the 1980s in the United States correspond to a shift toward business income being passed through to personal owners, and argue that top income shares constructed using income tax statistics before 1987 are likely to be significantly understated relative to those afterwards.

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1 Introduction

Studies of income inequality and, especially, studies of *top* income shares routinely rely on administrative tax data (for example [Piketty, 2003](#); [Piketty and Saez, 2003](#); [Atkinson, Piketty and Saez, 2011](#); [Aaberge and Atkinson, 2010](#)). This is usually the only type of information that can provide detailed coverage of the very top of the distribution — the crucial advantage given indications that high incomes have been growing more rapidly than the rest of the distribution in many countries. Naturally though, administrative tax data sources reflect the design of the tax system by including only information that is collected by tax authorities. Furthermore, such data are also affected by reporting behavior of taxpayers. As the result, reliance on administrative data influences the concept of income that researchers can measure and may result in non-comparability over time as incentives change. In this paper, we focus on perhaps the most important threat to comparability across tax regimes: observability of income related to business activity. Using data from Norway, we demonstrate the enormous sensitivity of measures of top shares derived from administrative individual income tax data to changes in the tax regime and implement an alternative accrual-based approach of accounting for business incomes, which is less sensitive to tax incentives in place. In the Norwegian case, this adjustment affects both the level and the observed direction of changes in measured inequality.

In developed countries business income is generally taxed in one of two main ways.¹ One form of taxation of business income is based on the pass-through concept: income of a firm is allocated to its owners and reported on individual income tax returns. This is a typical treatment of self-employed individuals and partnerships without limited liability. In some countries, the pass-through approach also applies to some firms with limited liability. Most notably, in the United States this is the approach that is applied to S-corporations and limited liability partnerships.² The alternative form of taxation of business income involves entity level taxation of firm profits using corporate taxation and, subsequently and separately, taxation of dividends or capital gains on the individual level at the time of payout or capital gains realization. Usually, even with administrative data, researchers cannot directly assign corporate profits to shareholders so that allocating income to owners in a way comparable to the pass-through approach is in practice not possible. Since capital

¹Some countries also have (usually optional) alternative forms of taxation of certain types of small businesses that are based on revenue or other characteristics of a firm (“presumptive taxation”).

²See [Clarke and Kopczuk \(2016a\)](#) for a discussion of changes in the structure of business taxation in the United States over time, and [Cooper et al. \(2015\)](#) for in depth evidence on the structure and importance of partnerships in the United States.

gains and dividends are taxable on the individual level, they are usually observable and the only feasible way of allocating corporate income to owners. We will refer to this dominant approach to measuring income as “realization approach.”

As the result, in applied work business income is usually captured through dividends and capital gains, but this involves many conceptual difficulties for the purpose of inequality measurement. First, dividends and capital gains are observed when paid or realized, which is, in general, at a different point in time than when profits accrue.³ Hence, income derived from immediately taxable sources such as wages, interest or pass-through entities and income derived from (non-pass-through) corporate tax base, are in general observed at different points in time — potentially resulting in different patterns over time. Second, realization of income influences ranking of individuals in any particular year and hence interacts with measurement of inequality. For example, it is well-known that capital gains tend to be realized in a lumpy manner (for example, corresponding to sales of businesses or life events that result in portfolio changes) and hence individuals move temporarily up the distribution in the year when capital gains are realized without corresponding changes in their underlying economic situation.⁴ Third, some of the corporate income may never show up on individual tax returns. Gains that are followed by subsequent losses would correspond to positive and then negative income under a pass-through approach, while only the net amount shows up under a (non-pass-through) realization approach.⁵ Unrealized capital gains held until death may not be taxed at all (step-up approach in place in the United States and Norway) or be taxed as beneficiaries’ income (carry-over basis).⁶ Fourth, tax incentives influence realization decisions and the choice of organizational form (e.g., [Gordon and MacKie-Mason, 1994](#); [Gordon and Slemrod, 2000](#); [Romanov, 2006](#)). Hence, changes in tax incentives can potentially affect measurement of inequality by modifying the mix of realization and accrual sources of income that researchers rely

³This also naturally generates deferral tax incentives that affect the timing of realizations. Some theoretical solutions for addressing this issue within a realization-based system have been proposed ([Auerbach, 1991](#); [Auerbach and Bradford, 2004](#)) but have not been tried in practice.

⁴In particular, there is substantial churning among the top income taxpayers. For example, among 4474 taxpayers who were among 400 returns with highest adjusted gross income in the United States in one of the years between 1992 and 2013, 3213 were on the list just once and only 129 were on the list for 10 years or more ([Internal Revenue Service, 2015](#)).

⁵Relatedly, corporate spending that benefits owners (see [Alstadsæter, Kopczuk and Telle, 2014](#), for indications of such behavior) would also lead to realized income understating the underlying economic income of owners. However, such spending corresponds to mis-measurement of corporate income as well by inflating costs, so this is not necessarily addressed by our approach (although, it may be reflected to some extent if temporal patterns of profits and inflated costs are not perfectly aligned).

⁶It has been the leading alternative proposal in the United States (it was enacted but never implemented and ultimately repealed in the late 1970s, and then briefly in effect during the 2010 “repeal” of the estate tax). An alternative is “constructive realization” that is used in Canada — under that approach, capital gains are deemed realized at the time of death of the taxpayer and show up as a single lump-sum income realization at that time.

on.

In this paper, we use data from Norway to illustrate implications and importance of these issues. We take advantage of the existence of a shareholder register that allows us to connect information for all corporations to individual tax returns for all adult residents of Norway, and construct comprehensive measures of income that include both individual and corporate incomes. In particular, we allocate corporate earnings to shareholders as they are earned and retained.⁷ The period that we study includes reforms that changed tax treatment of capital gains and dividends and organizational form incentives.⁸ Two prior papers were able to directly allocate profits to shareholders in Canada ([Wolfson, Veall and Brooks, 2015](#)) and in Chile ([Fairfield and Jorratt De Luis, 2016](#)) and document implications for the level of inequality and effective tax rates. We do so as well, but crucially the tax reform in the middle of our sample period allows us to demonstrate sensitivity to changing tax regime and characterize compositional shifts that are behind the effects on inequality.

Our main results for Norway are illustrated in Figures 1 and 2. Relying on individual income tax reports only and excluding capital gains (the red line), as is commonly done in the literature, implies that the top 1% share (Figure 1) is growing before 2005, spikes up in that year to almost 14%, only to drop in 2006 to under 7% where it stays until the end of the decade, and in the latter period it is similar to the income measure (blue line) that excludes dividends altogether. This corresponds to massive dividend payouts in 2005 (and to some extent even before) in response to the announced tax reform ([Alstadsæter and Fjærli, 2009](#)). Under our integrated accrual approach where we allocate corporate income to shareholders (in black), the top 1% share is larger — 8 to 17% — and with a stronger cyclical component and a different temporal pattern. In particular, the correction for corporate income has very little effect on the share of the top group before 2005, when exemption of dividends from taxation allowed for free pass-through of available corporate income. After 2005, however, the dividend tax provided strong incentives to retain earnings in the firm, introducing a substantial difference between individual income measured under the traditional

⁷Three earlier papers adjust individual income for unallocated corporate profits in Norway. [Fjærli and Aaberge \(1999\)](#) study the development in income inequality in Norway after a tax reform in 1992, [Aaberge and Atkinson \(2010\)](#) study top-income shares all the way back to 1875, and [Thoresen et al. \(2012\)](#) study redistributive impacts of the 2005 tax reform. Related to shareholder income, [Fjærli and Aaberge \(1999\)](#) and [Aaberge and Atkinson \(2010\)](#) replace observed dividends with imputed total returns to shares, where returns to shares are based on an estimated market value of the household's stocks multiplied by a common long-run average rate of return on the Norwegian Stock Exchange; and [Thoresen et al. \(2012\)](#) replace owners' dividends and net capital gains with the proportion of the directly owned firms' after-tax income.

⁸The reform modified incentives to choose different organizational forms for firms and promoted indirect ownership that allows for more flexibility in taxation of dividends and capital gains on the individual level (see [Alstadsæter, Kopczuk and Telle, 2012](#), for discussion of these changes).

realization approach and under our integrated accrual approach.^{9,10} Figure 2 shows that these effects are even bigger for the top 0.1% group. In neither of the cases, capital gains make much of a difference.¹¹

We also are interested in understanding what types of businesses are important for these changes. While it is tempting to think here of large publicly traded firms, we show that these large changes in inequality are accounted for by the behavior of closely held firms with relatively few owners and, correspondingly, by major shareholders in such firms. We also document that most of the post-2005 increase in retained earnings at the top happens through firms that are not owned directly, illustrating that allocating business profits to individuals critically requires the ability to see through multiple layers of ownership.¹² Finally, we also show that our preferred measure stabilizes the composition of the top group so that the reform itself does not have a major impact on the identity of individuals in the top income group.

While we use Norwegian data, we believe the main points apply broadly. To illustrate, Figure 3 shows top income shares in the United States (Piketty and Saez, 2003). Until 1986, there were strong tax incentives to be organized as a C-corporation — effectively, the equivalent approach to the dominant current organizational form in Norway. Hence, inequality in the United States until 1986 was measured in a way that was comparable to the uncorrected Norwegian data. In particular, given high top personal income tax rates that applied to dividend income, there were strong incentives against explicitly paying out dividends and toward alternative uses of fund such as retaining earnings, similarly as in Norway after 2005. Reduction of personal income tax rates introduced by the Tax Reform Act of 1986 led to a massive conversion from C- to S-corporate form, the latter being subject to the pass-through treatment (Auerbach and Slemrod, 1997; Gordon and Slemrod, 2000) and, since then, there has been a strong trend toward establishing new firms as

⁹Moreover, under our integrated accrual approach, the top income share is largely of similar magnitude over the whole period (both before and after 2005), suggesting that the approach is more robust to the tax regime in place. However, the figures also suggest that allocating corporate profits as they accrue actually induces top shares to be more volatile.

¹⁰There are two main limitations of our integrated accrual approach. First, there may still be re-timing of corporate profits, and a non-announced tax exemption on corporate capital gains from mid 2004 may thus contribute to explaining some of the high dividends and retained earnings in 2005. Such re-timing is a potential issue for pass-through entities as well. Second, capital gain may reflect expectations of future profits before they accrue so that allocation based on capital gains realization amounts to accounting for profits early and (potentially) to a different party than under the corporate profits based accrual approach. However, as seen in Figures 1 and 2, capital gains in Norway were quite small during the period we consider, so that the way of accounting for capital gains does not have large quantitative implications.

¹¹Capital gains in Norway have not been generally preferentially treated relative to other types of income. Before 2006, they were taxed at ordinary rates. After 2006, they are taxed in the same way as dividends.

¹²See Cooper et al. (2015) for evidence that it is also the case in the United States.

pass-through entities (either S-corporations or, more recently, limited liability partnerships; see [Clarke and Kopczuk, 2016a](#) for a description of these trends). Hence, after 1986, reporting of income in the United States is effectively closer to our corrected approach.

Focusing on the series that excludes capital gains, the striking feature of the overall trend in the United States is that the top income shares jumped dramatically from 1986 to 1988. To be more precise: measured income share of the top 1% jumped between 1986 and 1988 by 4.1 percentage points about equal to the *whole* change between 1988 and 2010 (4.2 percentage points).¹³ A non-trivial part of the 1986 jump is believed to reflect shifting between income and corporate base ([Saez, Slemrod and Giertz, 2012](#)). Our Norwegian results indicate that this jump is likely to correspond to a permanent difference in how top income shares are measured under a realization based (C-corporations) and an accrual based (S-corporations and partnerships) system, so that the level of inequality before 1987 is likely to be understated relative to that afterwards.¹⁴

The rest of the paper is organized as follows. In the next section we describe the Norwegian tax system and provide details of the data. In section 3, we discuss different approaches to measuring incomes, their use in the literature, and our ability to implement them. We then present our results in Section 4. The final section concludes.

¹³Mindful of this one-time jump, [Piketty and Saez \(2003\)](#) point to the series that includes capital gains as corroborating evidence of a secular growth in inequality. However, we will show that at least in the Norwegian case, there is little correspondence between realized capital gains and accrual income. As [Figure 3](#) demonstrates, the growth in the importance of capital gains at the top in the United States begins in 1979, after top capital gains tax rate reduction from almost 40% to 28%. The importance of capital gains appears to be reinforced after 1982, following the Economic Recovery Tax Act of 1981 that reduced the capital gains tax rate from 28% to 20% and exhibits very strong reaction to the Tax Reform Act 1986 that brought rates back to 28%. Together, this suggests that realization incentives played an important role (see [Lindsey, 1987](#); [Feldstein, 1995](#), for evidence of reported income response to the 1980s reforms that accounts for capital gains). Hence, the evolution of capital gains over the late 1970s and 1980s is consistent with changing incentives to realize, and thus need not reflect a secular trend. The contribution of capital gains to the top income shares in [Figure 3](#) shows that the early 1980s — the period of changing incentives — is only comparable to the period of very strong stock market dynamics in the late 1990s and mid-2000s. The role of capital gains during this era again highlights that the approach to allocating corporate profits to individuals is bound to matter. A more compelling alternative to realized capital gains is to use accrued capital gains. [Armour, Burkhauser and Larrimore \(2014\)](#) study implications of imputing accrual for the evolution of inequality in the United States since 1989 and [Burkhauser, Hahn and Wilkins \(2015\)](#) do so for Australia. [Figure 3](#) also shows a measure of the aggregate retained earnings — income net of deductions and dividends — of the United States corporate sector (other than S-corporations). It is clear that capital gains at the top of the distribution do not co-move with this accrual measure of non-realized corporate income. While not all of corporate retained earnings belong at the top of the distribution, their magnitude is large relative to changes in top income shares.

¹⁴Furthermore, because the shift toward pass-through treatment continued after 1986 as new firms were increasingly established to benefit from lower personal income tax rates, this raises the possibility that part of the post-1986 increase further reflects that more of the corporate income is passed-through and measured in the individual tax reports. See [Auten and Splinter \(2016\)](#) and [Clarke and Kopczuk \(2016b\)](#) for recent attempts to systematically adjust the top income shares in the US for corporate retained earnings.

2 Background and Data

2.1 The Norwegian tax system and the 2006 reform

The Norwegian dual income tax system levied a proportional tax of 28% on all income, both on individual level and corporate level, and an additional progressive surtax on individuals' wage income. Net capital gains were also included in taxable income until 2006, but dividends were tax-exempt in the same period.¹⁵ To protect creditors from owners excessively extracting assets from the corporation, the dividends that could be paid in a calendar year was restricted, among other things, by the accumulated retained earnings in the (publicly available) balance sheet of the previous calendar year — implying that profits accruing within a calendar year could not be distributed before the next calendar year (this restriction was largely lifted in 2013). The shareholder income tax was introduced on January 1, 2006, and levies capital income tax on all personal shareholders' return to shares, both dividends and capital gains, exceeding the after-tax risk-free interest rate.¹⁶ Dividends paid to corporations as well as corporations' capital gains from realization of shares are tax exempt.¹⁷ This means that by holding shares through a holding company, a person may defer capital gains and dividend tax until income is distributed to the personal level. A special regulation during 2005 actually allowed individuals to transfer their shares to a holding company, without triggering capital gains taxes that would otherwise apply. As documented by [Alstadsæter, Kopczuk and Telle \(2012\)](#), more than 8% of Norwegian shareholders transferred their shares to new holding companies during the last months of 2005. In addition, the tax-preferred way to organize a new corporation after 2006 is to establish indirect ownership structure with the main corporation responsible for the economic activity and a holding company that owns the individual owner's shares of the main corporation. Such ownership allows for both deferral of recognizing dividends and capital gains on the individual level, while permitting flexibility to disburse dividends and make changes to ownership of the main firm. We account for this in our empirical analysis by seeing through multiple layers of indirect ownership when distributing firm level earnings to the personal

¹⁵In order to prevent tax minimizing income shifting by re-labeling wage income as capital income in owner-managed firms, the so-called *Split model* (abolished 2005 for corporations) imputed a return to the capital in the firm, which was taxed as dividend income. The remainder was taxed as wage income.

¹⁶A so-called *rate of return allowance* (RRA), is tax exempt (but observable as dividends when utilized), and it is calculated as the price of the share (face value if not traded) times the after-tax interest rate on government bonds. If received dividends/gains are less than the RRA, the remaining is carried forward with interest and added to the imputed RRA in the following year.

¹⁷Also, corporations no longer get tax deduction for capital losses from shares. In order to prevent large behavioral effects in timing of the realization of gains/losses by corporations, this tax exemption of capital gains was implemented without warning on March 26, 2004.

owner.

The 2006 dividend tax reform was already announced in late 2004 and led to widespread timing effects in dividend payments as documented by [Alstadsæter and Fjærli \(2009\)](#), [Thoresen et al. \(2012\)](#), and [Alstadsæter, Kopczuk and Telle \(2014\)](#). Figure 4 illustrates that there was a strong timing effects in dividend payments to individual owners around the reform, with large dividend receipts in the years leading up to the reform and very low in the years after. It also illustrates that dividends paid to individual owners are much smaller than dividends that are distributed by firms. Overall distributions actually do not plummet after 2005 (or at least not permanently): firms still pay out substantial dividends after the reform, but they do so to non-individual owners such as holding companies and institutional owners rather than to ultimate owners (who are personal income tax payers).¹⁸

2.2 Data

We use very detailed administrative data from Statistics Norway covering the universe of Norwegian corporations, self-employed, and adult individuals (aged 16 and above) over the period 2000-2013. Every resident in Norway is assigned a unique personal identifier that is present in all databases, enabling us to follow every individual over time and across datasets. The same holds for corporations. Our data further contain detailed income information from compulsory annual tax reports for individuals and self-employed firms (covering calendar year). Corporate level data contain income tax statements, as well as information about taxes paid and detailed balance sheet information with asset and debt structure. We also have data on the identity of every shareholder of every Norwegian corporation, both private and public, both widely and closely held, and we know everyone's exact ownership shares in each corporation at the end of the calendar year. See Appendix A for further details.

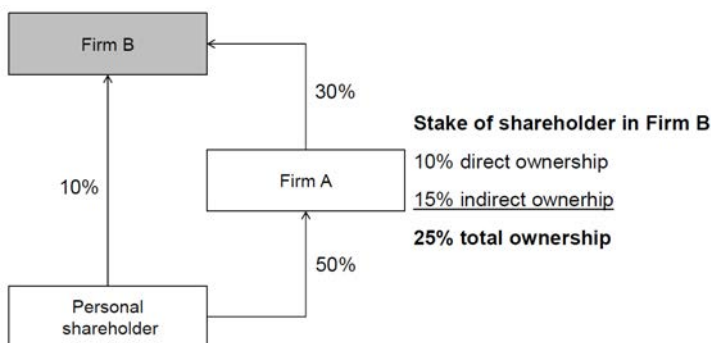
3 Income Concepts

The standard Haig-Simons approach to personal income is to define it as the sum of a person's consumption and the increase in his/her consumption opportunities over a time period. Some elements of consumption and consumption opportunities are inherently difficult or even impossible to measure, so that applied work typically relies on an equivalence of the change in ability to

¹⁸The dip in dividend receipts by households in 2001 is due to a temporary dividend tax that was in place for that one year.

consume and the sum of labor income and the change in net wealth over a calendar year (Simons, 1938). This is often operationalized as the sum of earnings (return to labor) and return on assets. However, income from business remains a prominent example of an income flow that is difficult to measure adequately and timely in available data, especially under the common realization-based tax regime.¹⁹ It is also a prominent example of an income flow that blurs the line between capital and labor income — the distinction that needs not to be made when the conceptual approach is based on the Haig-Simons definition, which is an important empirical advantage of this approach.

The advantage of our approach is that we can allocate business income on a timely basis. To do so, we allocate corporate level income to each personal shareholder according to his/her total ownership share in the corporation in the year when the corporate income is earned. The total ownership share is the sum of direct and indirect ownership shares. The indirect ownership is calculated as the product of the shareholder’s direct ownership share in firm A and firm A’s total direct and indirect ownership share in firm B. In the simple case of two layers illustrated in the picture,



the person holds a 10% direct ownership share in firm B and a direct ownership share of 50% in firm A. Firm A also holds a 30% direct ownership share in firm B, rendering the person’s indirect ownership share in firm B to 15%. The person’s total ownership share in firm B is then 25%. Based on this we will attribute 25% of the firm’s income to the person. Since firm B might hold shares in another firm C, the shareholder also owns part of firm C. In our approach, we also assign shares of firm C, as well as any further subsidiaries up to ten layers of ownership, to the shareholder.²⁰

To illustrate the importance of business income for top income shares, we define several individ-

¹⁹Another wealth-related income flow that is hard to measure, is consumption of housing. Unless realized in the calendar year (and not reinvested in the same year) and thus captured as capital gain (see below), we are not measuring this in our data. But net income flow from renting of real estate that is not the home, will typically be measured.

²⁰Our main results are similar when we restrict our analysis to two layers.

ual level income measures. The natural departure point is the administrative definition of “taxable income net of deductions” as defined by The Norwegian Tax Act. Its main components are income from labor (salaries, in-kind benefits, work-related welfare like sick-leave money and unemployment benefits, business income from self-employment), income from capital (interest, dividends, realized capital gains, etc.) and taxable transfers (like disability pensions, elderly pensions, etc., but not tax exempt transfers like means-tested social assistance, child allowances, health-care subsidies, etc.), but net of tax deductions (interest on debt, capital losses, various employment related expenses, some child care expenses, general deductions for pensioners, charitable contributions, etc.). To be able to estimate top incomes in Norway all the way back to 1875, [Aaberge and Atkinson \(2010\)](#) rely on this income measure and they discuss the advantages and disadvantages of income measures from tax assessments. In particular, due to differences in tax systems across countries, as well as changes in the definitions and deductions over time, it is not straightforward to compare results on top income shares based on such measures across time and countries. [Aaberge and Atkinson \(2010\)](#), among others, question the meaningfulness of such measures in the presence of income shifting related to tax reforms, and they show that substituting dividends with imputed average long-term returns on households’ stocks yields more moderate increases in top income shares between 1986-2005; and, similarly, [Thoresen et al. \(2012\)](#) also find that income inequality increases more moderately when dividends and capital gains are replaced by profits of directly owned firms. To pursue systematic analysis, we rely on a number of alternative measures that single out specific income components and disallow transfers and deductions.²¹ The four definitions are as follows:

1. I_B^{CG} = Income from labor (including self-employment) + income from capital (including dividends and capital gains)
2. I_B = I_B^{CG} – capital gains
3. I_C = I_B – dividends
4. I_D = I_C + individual’s share (s) of corporate income (π)

We proceed as follows to capture the individual’s share of corporate income. Denote a corporation’s profits in a given year t by π_t and an individual’s (combined direct and indirect) share of those profits by s . We are going to focus on after corporate-tax profits. We would like to assign $s\pi_t$ to an individual as income. In the case of a pass-through approach, like for self-employed or

²¹Consequently, we will also rely on before tax individual income measures. See Appendix A for details on our income measure.

for partnerships or S-corporations in the United States, this is exactly what is going to happen by default. When the business-source income is not subject to the pass-through treatment, a corporation may pay a dividend of d_t (and an individual's share of it is sd_t). Assuming for the moment a direct ownership of the firm, an approach that relies on income realization (I_B^{CG}) will account for income of sd_t in year t and will reflect (at least to some extent and augmented by return) the remainder of year t profits $s\pi_t - sd_t$ if and when additional dividends are paid in the future or when capital gains are realized. Note in particular that the level of dividend in year t does not have to bear any direct relationship to profits in that particular year: it purely reflects realization decisions, and dividends in any particular year may reflect current profits, past profits or (within some legal limitations) future expected profits.

Conceptually, we would like to allocate $s\pi_t$ directly to the individual. We do observe profits so this would be a straightforward task in case of direct ownership. However, since individuals could own firms through other firms, we need to ensure that we do not count the same profits more than one time. For example, if a firm B pays dividend to its corporate owner firm A, this dividend will comprise a part of firm A's profits (which will again contribute to the change in firm A's accumulated retained earnings). To handle this, we rely on the (Norwegian) accounting concept of "earned equity", which we will refer to as accumulated retained earnings. The accumulated stock of retained earnings in year t , R_t , is equal to $R_t = R_{t-1} + \pi_t - d_t$, i.e additional accumulation reflects this year's profits (or losses) with deduction for any dividends. Hence, the change in accumulated retained earnings, $\Delta R_t = \pi_t - d_t$, captures the income component that would have been passed-through to the owning individual(s) in a pass-through regime (S-corporation or self-employed). Aggregating changes in accumulated retained earnings across all firms corresponds to aggregating profits net of dividends to non-corporate shareholders. As a result, the sum of changes in accumulated retained earnings and dividends to non-corporate shareholders is equal to the economic profits of the corporate sector. We proceed by implementing this approach: an individual's share of corporate profits is equal to his/her ownership share of the year's change in accumulated retained earnings (through direct and indirect ownership) and any dividends received on the personal level.²²

²²While this use of balance sheet information on accumulated corporate earnings handles the problem of double counting dividends to corporate owners, it involves some drawbacks. Norwegian corporate finance law prescribes corporate holding of listed shares to be valued at stock market prices and not at costs of acquisition in the balance sheet. As illustrated in the following, this implies that an increase in the value of holdings of listed shares might be double counted. Assume that a holding firm H fully owned by a person P, holds s percent of the shares in a listed firm L. Further, assume that the listed firm L has profits of A during the year, and to simplify that the profits is exactly reflected in the stock market value, meaning that the value of L increases by A during the year. We will then

We also considered constructing an additional measure of income “ $I_E = I_D +$ capital gains net of previously allocated corporate income” that would partially account for capital gains while retaining the virtues of accrual-based approach when possible. However, this measure cannot be constructed unless accrued income over the whole holding period is observed. In practice, we can only observe it for assets that were purchased during the coverage of our data. Given small quantitative importance of capital gains for the top shares in Norway visible on Figures 1 and 2, we opted against pursuing a, necessarily imperfect, implementation of this type of approach.²³

4 Results

Our main results, showing the income of the top 0.1 and 1% as a share of the total income (sum of the same income measure for everyone aged 16 and above), are presented in Figures 1 and 2. In the post-2005 tax regime, when incentives to pay dividends were weak and firms instead retained earnings (as we will illustrate shortly), allocating corporate earnings to shareholders (accrual approach) has dramatic impact on the level of top income shares, more than doubling them (relative to realization-based approach) when one looks at the top 0.1% of the distribution. In contrast, the effect of accounting for retained earnings is minor in the pre-2006 period. Hence, our results strongly suggest that the tax regime in place has a major effect on the inequality measures when

first count P’s share of the change in accumulated retained earnings of L (sA). However, because of the finance law valuation prescription, the accumulated retained earnings of H will also increase by sA, implying that we count sA twice when calculating P’s corporate income. However, since retained earnings from large or listed companies only comprise a small fraction of total retained earnings of top incomes (see Figure 11 and related discussion at end of Section 4.2), the potential measurement error might not be large. Indeed, we created the top income share plots excluding accumulated retained earnings of listed firms, and the results are barely distinguishable by eye from those in Figures 1 and 2.

²³It is still useful to note though how capital gains might be accounted for in principle. Capital gains give rise to an additional set of problems. The value of the firm V_t reflects expectations of future profits (let us denote discounted value of future profits as π^E) and the market value of any marketable assets M_t such as cash or other tradeable assets (in particular, the value of non-tangibles is reflected in the future profit component and — to the extent that they might be traded beyond its value of generating future profits — the remaining part should be included in M_t). The capital gain $V_{t+j} - V_t = \Delta\pi_t^{E,t+j} + \Delta M_t^{t+j}$ over holding period $j > 0$ represents the change in the value of these two components. For non-publicly traded firms, we have no ability to observe changes in prices, and we can only observe changes in ownership and capital gains at the time of realization, so that we cannot assign capital gains to individuals on an accrual basis. However, our approach to allocating corporate profits actually does account for part of the capital gain by allocating earnings as they accrue. If instead earnings were paid out as dividends at the time of accrual, the value of the firm would have been reduced and future capital gains would be lower. Naturally, the value of funds within and outside of the firm is not the same, but evaluating it is the question of use (similarly as consumption or investment decisions of an individual) rather than income. Hence, our preferred approach to incorporating capital gains would be to adjust them for earnings that have been already assigned to individuals over the holding period — effectively, adjusting capital gains for unpaid dividends so that the remaining component would reflect the increase in value of the firm beyond mechanical effect of past earnings. Under such an approach, actual realized capital gains are very likely to be adjusted downward for individuals who are at the top of the distribution (upward adjustment would correspond to losses).

using realization-based information from personal income tax returns.

One unexpected feature of our results is that despite strong incentives to pay dividends in 2005 (in fact, they were at the all time high, Figure 4), we see that the retained earnings already contributed to the top income share in that year. This is because the legal restrictions in the Norwegian tax system imply that dividends generally can only reflect profits in prior years and cannot be paid out of current profits.²⁴ As the result, most of the 2005 profits were effectively subject to the post-reform taxation on personal income tax returns. Aggregate profits were in fact very high in 2005 (see Figure 7 and discussion below) and hence, as the result of the legal restrictions, both dividends and retained earnings were major contributors to top shares in that year. Nevertheless, we document in Appendix B that taxpayers were in fact aggressively maximizing dividends paid out in 2005, subject to legal limits that they faced.

Our results also show that capital gains from individuals' tax reports play a relatively minor role in shaping measurement of top income shares in Norway.²⁵ When included in the realization-based measure of top income shares (I_B^{CG}), they shift up both the top 0.1% and top 1% measures by between 0.2 and 1.4 percentage points, with elevated values in 2000 and 2006-7, but otherwise with no clear temporal pattern and no important qualitative effect on the overall evolution over the time. In particular, whether or not they are accounted for makes little difference for the comparison of the inequality patterns arising from the accrual- and realization-based approaches.

4.1 Relationship to aggregate changes

In order to understand these adjustments to inequality, it is useful to first illustrate the behavior of aggregate series. Figure 5 shows that the Norwegian economy was generally growing during this period although with more pronounced fluctuations when the very important oil sector is included than when it is not. The 2003-2008 period was a rapid expansion followed by a short-lived recession. The figure also shows the accumulated retained earnings aggregated over all the

²⁴To protect creditors from owners' excessively extracting assets from the corporation, the dividends that could be paid in a calendar year was legally restricted, primarily by the accumulated retained earnings in the publicly available balance sheet of the previous year. This means that in most cases corporations could not pay more dividends in 2005 than what the balance sheet of 2004 allowed. Indeed, our data show that the share of corporations that did in fact maximize dividends according to the limits following from the balance sheet of the previous year peaked at 73 percent in 2005. In Appendix B, we discuss evidence on dividend maximization in more details and, in particular, Figure A.1 shows that it was widespread at the top percentile just before the reform.

²⁵Corporate capital gains in Norway have not been generally tax advantaged — they were taxed as ordinary income before 2006 and at the same rate as dividends after the reform. As the result, the Norwegian shareholders of privately held firms may simply realize dividends instead of pursuing strategies to convert them into capital gains for tax purposes. Another reason is that capital gains on privately owned and used real estate are tax exempt in Norway, and thus not captured in our data. This is not so in e.g. Sweden (Roine and Waldenström, 2012).

corporations in our data set and Figure 6 shows it as a share of GDP. There are two important points here. First, the stock of accumulated retained earnings grows rapidly after 2005, increasing from about 50% to 80% of total GDP. Second, we deliberately contrast the stock of accumulated retained earnings with GDP (flow). Accumulated retained earnings are unpaid dividends held in the corporate sector that correspond to past earnings and their stock can in principle be converted to the flow of dividends. They are massive relative to the overall income and hence the pattern and changes in their realizations are bound to confuse realization-based inequality statistics, as is evident in the contrast between realization-based income and accrual-based income in Figures 1 and 2.

It can also be confusing to use aggregate series of profits and dividends to try to reason on inequality. Figure 7 shows three series: total after-tax profits, aggregate dividend payouts and aggregate change in accumulated retained earnings. We construct these series by aggregating our micro data. Total profits were volatile over the period and, in particular, they rapidly increased between 2003 (pre-reform) and 2007 (post-reform). This effect partially reflects a booming economy. Nevertheless, the profit series is in an important sense misleading. It reflects profits of all firms including corporate owners; as the result, dividends to corporate owners effectively induce double-counting. Total dividend payouts fluctuate much less than profits and show no decline after 2005. As we have already illustrated in Figure 4, total dividend payouts also correspond to massive double-counting of income because of the importance of corporate dividends. The flow of retained earnings is the main component of the difference between profits and dividends. The annual change in aggregate accumulated retained earnings fluctuated much more than aggregate dividend payouts over the period. It was small before 2006, generally increased afterwards but behaved in a volatile fashion. In particular, it briefly fell close to the negative territory during the 2008 recession.

These aggregate patterns should be contrasted with the effect that accounting for the change in accumulated retained earnings has on the top shares in Figures 1 and 2. The volatility of the change in accumulated retained earnings does translate to some extent into volatility of top shares, but the effect is not mechanical and it is quite subtle. In particular, in the post-reform period, accounting for corporate profits has a massive effect on top shares throughout, even though the change in aggregate accumulated retained earnings in some of the years (2008 and 2011) was very small: the aggregate over the whole corporate sector masks substantial inequality across firms since some firms have large losses while others are successful. In particular, it suggests that imputation approaches based on allocating aggregate retained earnings or profits are unlikely to accurately

capture distribution unless heterogeneity in profitability can be accounted for. We will compare our approach to an imputation approach in Section 5.

Figure 8 compares the aggregate importance of the change in accumulated retained earnings with dividends and capital gains reported on personal income tax returns. First, as already noted, retention of earnings appears to substitute for dividends after 2005. Second, in good years after 2005, newly retained earnings are by an order of magnitude more important than dividends and capital gains combined. Hence, accounting for income retained on the corporate side is extremely important and there is little hope that capital gains and dividends can proxy well for it; or that, in fact, they can even account for it with a lag.

4.2 Composition of top groups and shares

Based on our preferred integrated income measure we construct the top 1% and 0.1% groups, and then decompose income of these individuals into its sources; see Figures 9 and 10. Not surprisingly, given our previous discussion, the importance of dividends for the top groups has declined after 2005 and the importance of accumulated retained earnings increased — in fact, the relative importance of realized and unrealized dividends has flipped. Supporting our approach to measuring income and its usefulness in accounting for inequality patterns, the overall contribution of corporate income from all sources (dividends and retained earnings) to the income share of the top groups has remained fairly stable. In particular, smoothness of the combined share of corporate income provides no indication that this integrated way of accounting for corporate source income might be systematically affected by the tax regime in place.

It is also worth noting that dividends and the change in accumulated retained earnings are by far the most important component of top income at the very top. For the top 0.1%, they generally account for about 80% of top incomes, with wages accounting for at most 15%.

Figure 11 documents that the adjustment for retained earnings is driven by closely-held firms. For each firm, we know both the retained earnings and the number of individual owners, and we can thus separately attribute retained earnings from firms with up to 10 owners and more than 10 owners. Virtually all of the retained earnings that we allocate at the top of the distribution have their source in firms with 10 or fewer owners. This result is consistent with [Jacob, Michaely and Alstadsæter \(2015\)](#) who show that payout of firms held by few owners is more sensitive to changes in dividend taxation than firms with dispersed ownership. Figure 12 further shows the bulk of adjustment is attributable to owners that have large ownership share in their businesses.

In Figure 13, we show that earnings retentions took place primarily (though not exclusively) through indirect ownership. Introduction of dividend tax encourages all firms to retain earnings, but indirect ownership offers additional benefits by allowing the flexibility of directing future realization of corporate income (through dividends or capital gains) to the holding company and continuing to defer recognition of that income on personal tax return. Figure 13 separates two different types of ownership: through so-called E-firms and the rest. E-firms are holding companies that could be created in 2005 by relying on a transition rule: Owners of existing companies were allowed²⁶ to transfer their shares into a new holding company (E-firm) without triggering tax liability. Alstadsæter, Kopczuk and Telle (2012) analyze adoption of these holding companies. For our purposes, E-firms simply represent conversion of direct ownership to indirect one in 2005,²⁷ and Figure 13 shows both that such conversions were quantitatively important at the top of the distribution, and that they result in indirect ownership accounting for majority of business income of the well-off. As the result, the ability to see through such indirect structure is critical for appropriately allocating business income to the ultimate owners.

4.3 (In)stability of top groups depending on the approach

An income measure that is differentially affected by tax incentives over time is bound to lead to re-ranking of individuals, while a comprehensive income measure that does not suffer from such problems should not result in such re-ranking, unless there is quantitatively important and heterogeneous behavioral response (Kopczuk, Saez and Song, 2009; Aaberge, Atkinson and Modalsi, 2013). Figure 14 displays mobility of individuals in top income groups over time, and it shows the likelihood that an individual who is at the top of the distribution in year t was also at the top of the distribution in year $t - 1$. It is very clear that when the realization-based income measure I_B is used, the tax reform in 2005 results in significant re-ranking — this is another manifestation of the problems that this method has with proper accounting for corporate source of income across tax regimes. This re-ranking has been observed before by Aaberge and Atkinson (2010) and studied further by Aaberge, Atkinson and Modalsi (2013). Slightly more subtly, mobility of individuals is otherwise lower when this approach is used and appears even lower after 2005 — this is because by effectively missing the more volatile corporate incomes, the top group consists to a larger extent of

²⁶Owners had to meet certain conditions. They had to transfer all their shares and the holding company had to own at least 10% of the original firm. The new holding company had to be registered by December 31st 2005.

²⁷We identify E-firms by the NACE-code 65.238: Portfolio Investments. That code was rarely used before 2005, so the vast majority of such firms are created under the transition rule. The small amount of ownership labeled as E-firms before 2006 visible on Figure 13 corresponds to those rare cases.

the more stable wages and dividends.

In contrast, mobility of the top group using our preferred accrual-based approach I_d is very stable over time; in particular it does not exhibit a significant trend and does not show any important adjustment around the tax reform. It seems that our approach to allocating firm profits to individuals has indeed made the composition of the group robust to the change in tax regime. We interpret it as a strong indicator that our approach is in fact able to much more closely approximate the underlying income of individuals than the purely personal income tax-based alternative.

Given these differing mobility patterns, it is clear that the top groups under each of the approaches consist of different individuals. On Figure 15 we illustrate it in more details by showing the shares of top 0.1% and top 1% group that are in the top group regardless of the approach. Before the reform, almost 80% of the top 0.1% and 90% of the top 1% of individuals under the integrated approach would also be at the top using the realization based approach. Similarity of the membership of the top groups breaks down dramatically after 2005 and the effect is massive for the very top group where the methods agree on assigning membership to the top group in less than 50% of cases.

Concluding, the integrated approach induces an important re-ranking of individuals at the top of the distribution. By doing so, it stabilizes the measures of year-to-year mobility of the top groups and corrects tax-reform driven swings in measurement of top income shares. Coupled with the conceptual rationale for this approach that highlights consistent treatment of earnings as they accrue, we conclude that this approach provides a much more realistic picture of the evolution of top income shares over time.

5 Concluding remarks

We show that accounting for retained earnings is important both for measuring the level and — when tax incentives evolve — changes in inequality. Doing so also indicates that re-ranking due to changes in observability of income was quantitatively important, but a comprehensive income measure that accounts for retention does not suffer from the same problems. We make use of complete business register information that allows us to see through multiple layers of ownership — this is important because it turns out that retained earnings hidden behind indirect ownership account for half of incomes of the top 0.1% after 2005.

The problem with retained earnings is not limited to the measurement of inequality. [Driessen](#)

(2014) notes that the approach that ignores retained corporate income is nowadays common in estimating distributional consequences of tax policy.²⁸ However, absent ownership information, addressing this issue requires some imputation-based approach to assigning corporate side income to shareholders. One can imagine various imputation methods that can address the lack of precise information about ownership. For example, [Armour, Burkhauser and Larrimore \(2014\)](#) use asset information from the SCF and rates of returns across broad asset classes to impute accruing capital gains at various points across the distribution. Alternatively, one can rely on observed capital gains or dividends to infer ownership. [Saez and Zucman \(2016\)](#) follow this path in order to allocate ownership of corporate equities in their wealth distribution estimates and [Thoresen et al. \(2012\)](#) rely on a related approach to understand distributional implications of the 2006 Norwegian reform.

We investigate whether imputations based on dividends can allocate retained earnings correctly, see [Figure 16](#). To do so, we simply assign ownership of aggregate retained earnings that belong to individuals (calculated from micro data) according to observed received dividends. In general, this way of imputing results in understatement of retained earnings at the top of the distribution, with the exception of 2005 when both retentions and dividends were large. Mechanically, the approach does particularly poorly in years when aggregate retained earnings of households were negative because it cannot discriminate between losses to the general public and gains at the top.²⁹ However, even in other years, such imputations can account for only between 20 and 60% of retained earnings that should be allocated to the top 0.1%. This is driven by the combination of losses and the imperfect correlation of dividends and retained earnings (in fact, note that *ceteris paribus* for a particular firm, dividends and retained earnings have to move in the opposite directions).

To sum up, imputing retained earnings based on dividends still leads to a significant understatement of inequality and that is despite the fact that our use of micro data (rather than assigning imputed income to groups) allows for re-ranking of individuals. Furthermore, our previous analysis highlights that it is closely held firms that are important and we have seen that the possibility of negative retained earnings (and more generally losses) makes the imputations difficult (and also casts doubt on relying on *average* rate of return to impute income based on asset values). By

²⁸The objections to it have been recognized for a long time. For example, the celebrated 1984 United States Treasury tax proposal that paved the way for the Tax Reform Act of 1986 ([Department of the Treasury, 1984](#)) accounted for corporate income in its distributional analysis noting that “*Economic income* reflects the view that corporations are not separate from their stockholders, but that the income of corporations is income of its stockholders; therefore, economic income allocates pre-tax corporate profits both to individuals who own stock directly and to those who own stock indirectly (...)” (page 58).

²⁹One can of course imagine a simple adjustment to this procedure if aggregate profits and losses are observed separately. Note though that negative retained earnings do not necessarily correspond to losses.

relying on precise ownership information, we can avoid these pitfalls.

While our approach was implemented on Norwegian data, our findings are relevant for other countries as well. As shown in Figure 3, the United States Tax Reform Act of 1986, which strongly encouraged pass-through treatment of top incomes, resulted in a massive adjustment of top income shares. Furthermore, Figure 3 also illustrates that total corporate retained earnings are very large relative to changes in inequality. If the whole 4.1% percentage point increase between 1986 and 1988 was due to increased reporting of corporate source incomes on individual tax returns, it is easy to see from Figure 3 that such “corrected” top income shares would show no upward trend between the 1970s and the mid-1990s, significantly altering our understanding of the evolution of top income inequality in recent decades.

Alternatively, the Tax Reform Act of 1986 may also have had an effect on reported incomes through behavioral response and not just reporting. A large body of work on tax responsiveness of taxable incomes was recently surveyed by Saez, Slemrod and Giertz (2012). This literature usually focuses on reported incomes — stripped of S-corporation source income and capital gains — to analyze the effect on the remaining “stable” component. To illustrate the potential of behavioral response here, the top 1% share in 1986 according to Piketty and Saez (2003) data was 0.091 in 1986 and 0.132 by 1988. The top marginal tax rate changed from 50% to 28%, corresponding to the change in the log net-of-tax rate of $\log(1 - 0.5) - \log(1 - 0.28) = -0.364$. This net-of-tax rate change multiplied by the estimate of taxable income elasticity (which is customarily computed with respect to the net-of-tax rate) yields the implied percentage change in top income share for the given strength of behavioral response. The preferred estimate of elasticity of responsiveness according to Saez, Slemrod and Giertz (2012) is about 0.4, which would then imply an increase in top 1% income share from 0.091 to 0.105 — explaining only about 1/3 of the observed increase between 1986 and 1988. The higher end of the estimates in the literature is about 1 — such large responsiveness could in fact explain all of the increase (it implies an increase from 0.091 to 0.131). In fact, the most prominent of such estimates (Feldstein, 1995) effectively does amount to interpreting the 1986-1988 increase as the response to tax rate changes. It is important to note that the reporting and behavioral response explanations are in fact not distinct because behavioral response measured in the literature may in fact be reflecting reporting rather than real effects.

More broadly, this discussion suggests that simultaneous claims of a large increase in inequality before the 1990s and low behavioral responses are mutually inconsistent. If behavioral responses are small, then almost the whole increase in inequality took place immediately after 1986. Absent

real response to taxation, one would be left with either the belief that inequality somehow happened to experience a one time jump right after 1986 — a very arbitrary explanation — or that the effect is due to the effective shift from realization-based toward accrual-based approach that the reform corresponded to, so that top income shares before and after 1986 are measured in a different way. Our Norwegian evidence suggests that such a shift has potential to have large effects. Alternatively, the behavioral response may have also played a role, but one would need massive real responses to tax rates in order to explain this change without appealing to problems with measurement of inequality. Furthermore, capital gains do little to correct realization-based measurement problems in Norway, because they are small relative to changes in accumulated retained earnings (both in aggregate — Figure 8 — and at the top — Figures 1 and 2) and show little correlation with that volatile series. There is definitely much more action involving capital gains in the United States around 1986, but it seems unlikely that they correspond to profits as they accrue, rather than reflecting profits over longer holding periods realized at opportune timing.

The key advantage of our Norwegian data is ability to allocate profits to shareholders. We are not able to do the same for other countries. One may still, though, shed some light on the importance of these types of issues by evaluating the importance of accumulated retained earnings (undistributed profits) relative to dividends as well as the importance of pass-through entities elsewhere. This exercise is still limited by data availability: in the Norwegian case, we observe balance sheets of all firms while the evidence that follows is based only on large publicly traded firms with — naturally — dispersed ownership.

Firm level profits that are retained in the corporation and not distributed to owners are considerable in most developed economies. Firms retain earnings, for example, to fund investments internally (Auerbach and Hassett, 2002) and, thus, a substantial part of profits is not distributed as dividends. Figure 17 illustrates trends in changes in accumulated retained earnings and dividends that are conceptually similar to series presented on our Figure 8 for Norwegian firms, although rely on a different set of firms. The bulk of the corrections in the Norwegian case was driven by closely-held businesses. Here, we instead use data on listed firms for nine large economies from Worldscope and include all listed firms that had i) information on accumulated retained earnings in the current and previous year, and ii) information on dividends.³⁰ We then sum changes in accumulated retained earnings, as well as dividends, over all firms in a year and convert to nominal

³⁰We include the countries that had sufficient coverage of the listed firms included in the database, unfortunately that was not the case for Norway.

billion USD.

We see that the two series are of the same order of magnitude so that not accounting for retained earnings is likely to be problematic everywhere. For instance, for 1998 in the United States, the listed firms distributed about 200 billion USD to shareholders, but about the same amount was retained in the firms. As this paper indicates, this is income earned by the same shareholders, but not registered in the personal income statistics, leading to underestimation of their income, and disproportionately so compared to lower income individuals if not explicitly accounted for in some other fashion. Furthermore, dividends are very smooth (consistently with conventional wisdom in the literature), while accumulated retained earnings are much more volatile, similar to what we have seen in the Norwegian case and suggesting that the personal income tax based approach may have problems accounting for business-cycle changes in inequality. Finally, the relative importance of dividends and retained earnings varies across countries — dividends appear particularly small in Japan and more important elsewhere, suggesting that cross-sectional comparisons of inequality across countries may be sensitive to these types of issues as well. In addition, the tax system in these countries can have large effects on the measurement of inequality because dividend and capital gains taxation has not only large effects on the level and channel of payout, but also on the fraction of cash flows that is paid as dividends ([Jacob and Jacob, 2013a,b](#)).

This is of particular importance because there is substantial cross-country variation in the importance of unincorporated and corporate businesses (roughly, a proxy for pass-through vs corporate tax treatment, although S-corporations in the United States are an important example that does not fit in that classification). [Table 1](#) presents statistics on the importance of different organizational forms based on Eurostat data for 2011. The share of employment is concentrated in the corporate sector in countries such as Sweden, Norway, or the United Kingdom. Other countries such as France, Italy, Germany or Hungary have substantial employment in unincorporated businesses. Of course, unincorporated firms may have their own issue for measuring inequality, for example if they are more prone to tax evasion. To summarize, the importance of corporate-source unrealized income for inequality measurement differs across countries which substantially reduces comparability of inequality statistics across countries and the Norwegian evidence makes it clear that issues of comparability are important even within a country. A careful evaluation of the importance of corporate income for inequality in other countries is an important direction for future work.

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A Description of Data

Our individual-level data to which we have merged corporation information, are based on administrative registers maintained by Statistics Norway. We use three main data sources. First, we have individual income tax information (*Individual Data*). Second, we have information on all businesses (*Corporation Data*). Finally, we have the full shareholder register (*Ownership Data*). Each individual can be identified over time and across registers by the same unique personal identification number provided all Norwegians at birth or upon immigration, and each corporation can also be identified over time and across registers by one unique firm identifier.

Our first data source (*Individual Data*) covers all Norwegian residents (about 5.1 million) for each calendar year 2000-2013. It is mandatory for adult Norwegian residents to submit a tax statement every year, and we have all these statements (information originating from the Norwegian Tax Authorities). Individual tax information comprise income, e.g., labor income, business income, and capital income (including dividends). Our main income measure (I_B^{CG}) includes i) income from labor, i.e. earnings and other benefits from employers (like private use of employer's car, newspapers, phone, child care), as well as net income from self-employment; ii) capital income, i.e. interest, dividends, capital gains and losses, net income from renting of real estate, etc.; and iii) taxable transfers, like unemployment benefits, sick leave benefits and pensions (see [Steinkellner 2003](#) p. 40 for details). From the original dataset, we exclude individual-year observations where the individual's age is below 16. In total, our statistics are based on 54,423,145 observations and 4,930,201 individuals.

The second data source (*Corporation Data*) comprises of all businesses incorporated and taxable in Norway over the 1999-2013 period (including also corporations like banks, insurance companies and financial holding companies, but not public mutual funds). This data cover the balance sheet with detailed equity and debt information as well as the profit and loss statement of each corporation (information originating from the Norwegian Tax Authorities). Using these data, we construct a panel of 313,249 corporations for which we can compute the change in accumulated retained earnings for the period 2000-2013. In total, we have 2,059,972 corporation-year observations with changes in accumulated retained earnings that can be attributed to individual income tax statements.

To link retained corporate earnings from the *Corporation Data* to the *Individual Data*, we use the shareholder register (*Ownership Data*). These data cover every shareholding of each corporate and individual shareholder (also originating from the Norwegian Tax Authorities). For example, in

2011, we have 2,051,354 unique shareholder-corporation pairs for 213,484 corporations, with 689,050 (direct) individual shareholders and 90,590 corporate shareholders.³¹ The retained earnings are attributed to the corporate and individual shareholders. As individuals can indirectly hold shares in a firm, we account for 10 layers of indirect ownership. The final individual shareholding of each individual in each firm accounts for such indirect shareholdings. We then sum the change in accumulated retained earnings across all shareholdings for an individual and then merge this information to the *Individual Data*.

B Maximizing Dividends

We expect corporations to maximize dividends in the last years before the tax reform in 2005, and to check this we follow the approach of [Alstadsæter, Kopczyk and Telle \(2014\)](#). To define dividend maximizers, we operationalize the two main legal restrictions on dividends. First, only accumulated earned equity from the balance sheet of the previous year can be distributed in the given year. Our operationalization of earned equity is a proxy, since there are additional factors (which we do not have data to incorporate) that should be deducted from our measure of earned equity to find the exact legal limit on dividends. Second, remaining equity after dividend payments needs to be at least 10% of total assets, again as stated in the balance sheet of the previous year. To be able to illustrate the patterns before 2004 we use *ordinary* rather than *distributed* dividends (data on the latter not available before 2004).

Some corporations have no earned equity (because they have paid it out in the past or have accumulated losses) or their equity level is below 10% of assets. Such corporations have no ability to legally pay any dividends. The remaining corporations can pay dividends. We define as maximizers corporations that after proposing the positive dividend have the equity/asset ratio of between 0.09 and 0.11 or that propose a dividend exceeding 95% of its earned equity.

In all years, about 40% of the corporations had no earned equity or their equity level is below 10% of assets. Such firms have no ability to legally pay any dividends. In 2005 nearly half of the corporations that have the ability to pay dividends decide to maximize their payouts. Given that 39% pay any dividends in 2005, and 62% of those who have the ability to do so, the median corporation that pays dividends in 2005 does so to the maximum extent possible (see [Alstadsæter,](#)

³¹Note that we also have information on foreign ownership, but the information is limited to the country of the direct owner. There are no other identifying information. On average, foreign shareholders account for about 11% of aggregated accumulated retained earnings in Norway.

Kopczuk and Telle, 2014, for more extensive discussion). Figure A.1 shows these patterns focusing on the top of the distribution. Maximization of dividends was widespread in the top 1% just before the reform — at least 60% of individuals in the top 1% owned firms that did so and 20% owned a majority stake in such firms. The incidence of dividend maximization dropped sharply immediately after the reform. Figure A.2 shows that majority of dividends received by the top group is accounted by dividend maximizers. These results highlight two things. First, they reinforce our finding about strong importance of taxation on the patterns of reported income. Second, they indicate that top taxpayers were facing a legal constraint in their dividend payouts suggesting that large retentions before the reform (in 2005) were not by choice but rather due to the presence of constraints on ability to drain funds from the firm. One may presume that firms that maximize payout are not going to be simultaneously retaining earnings. As A.2 shows, this is so in all years with the sole except for 2005, when retentions by dividend maximizers are a non-trivial share of overall retentions.

Figure 1: Top 1% in Norway using different approach to measuring income

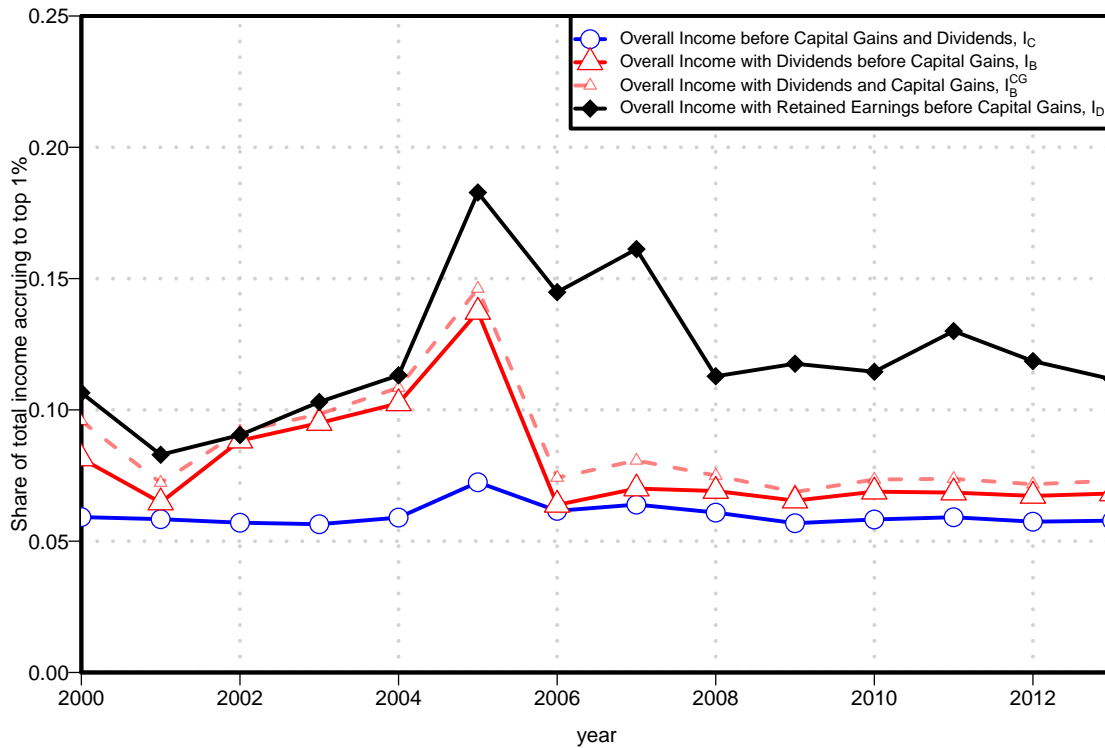


Figure 2: Top 0.1% in Norway using different approaches to measuring income

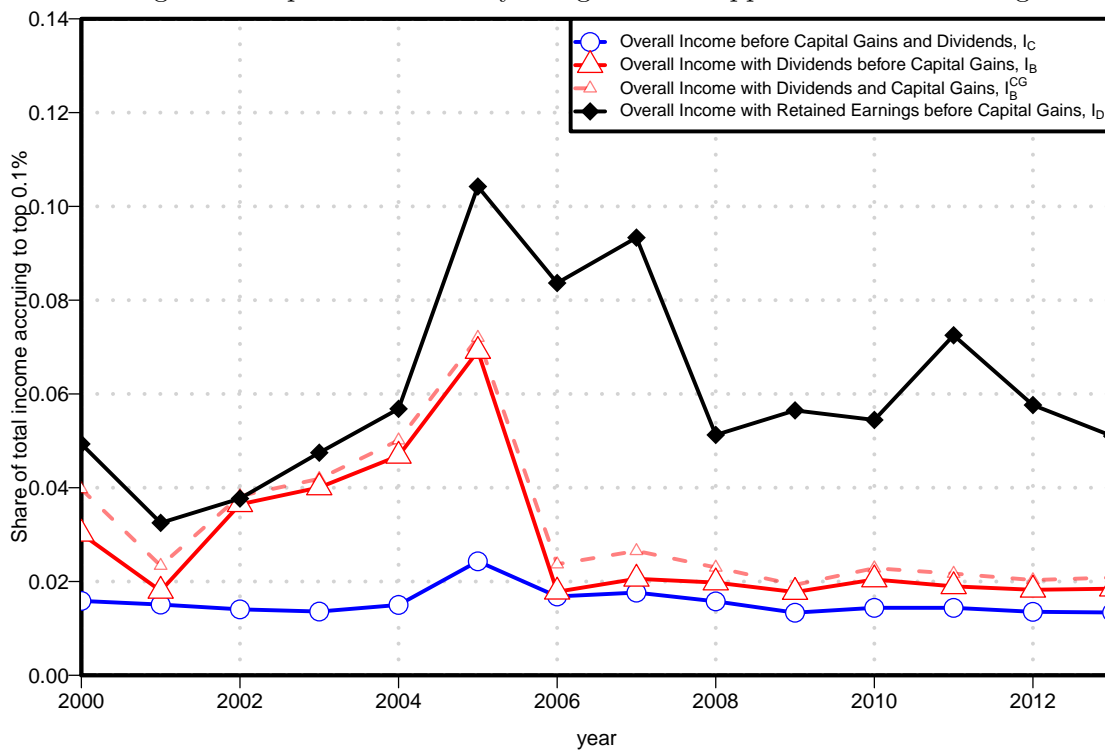


Figure 3: Top 1% income and earnings share in the United States

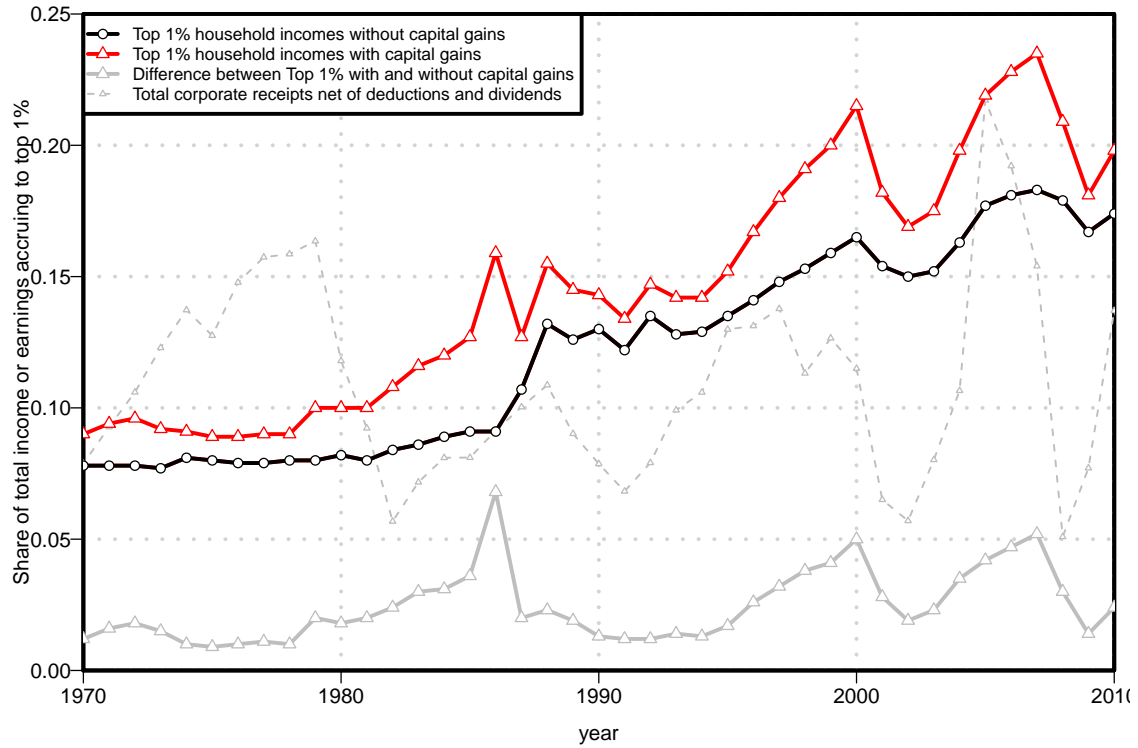


Figure 4: Total dividends distributed and received by individuals

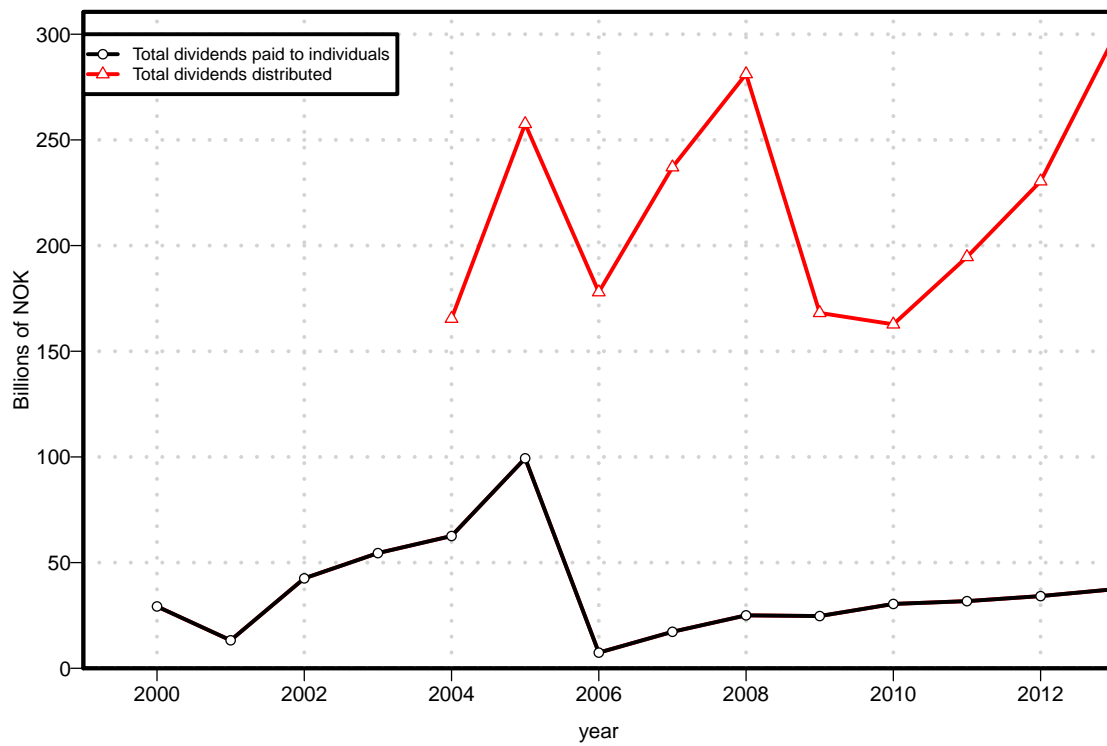


Figure 5: GDP and total accumulated retained earnings

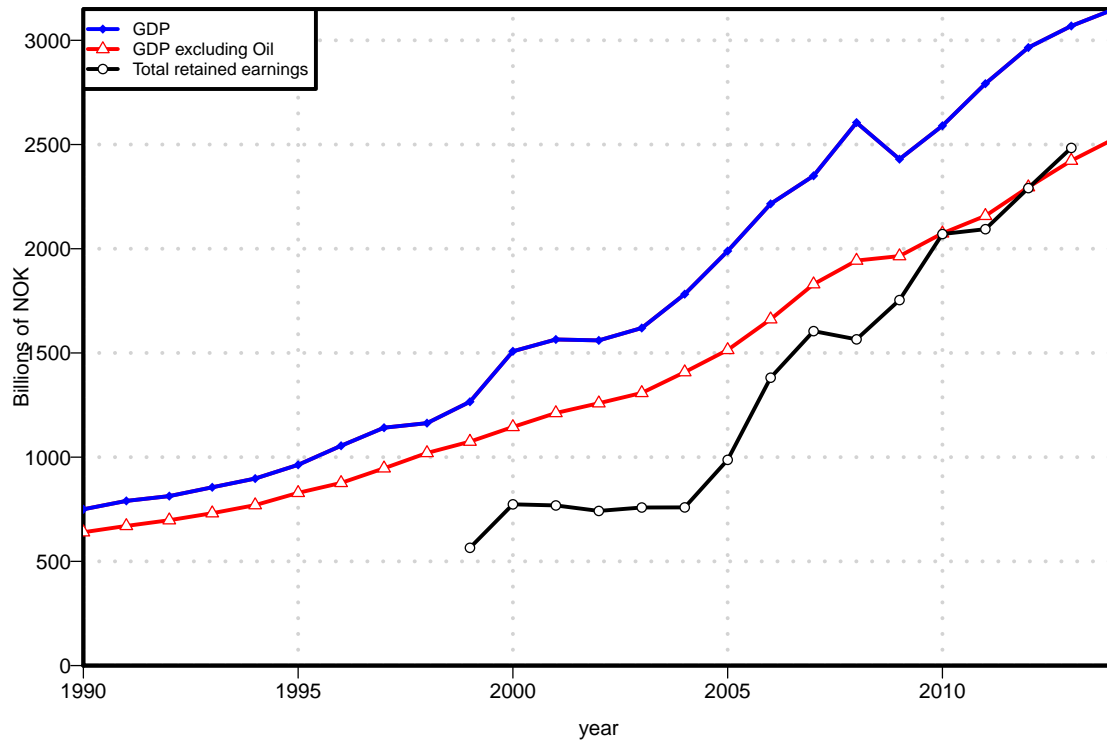


Figure 6: Accumulated retained earnings as a share of GDP

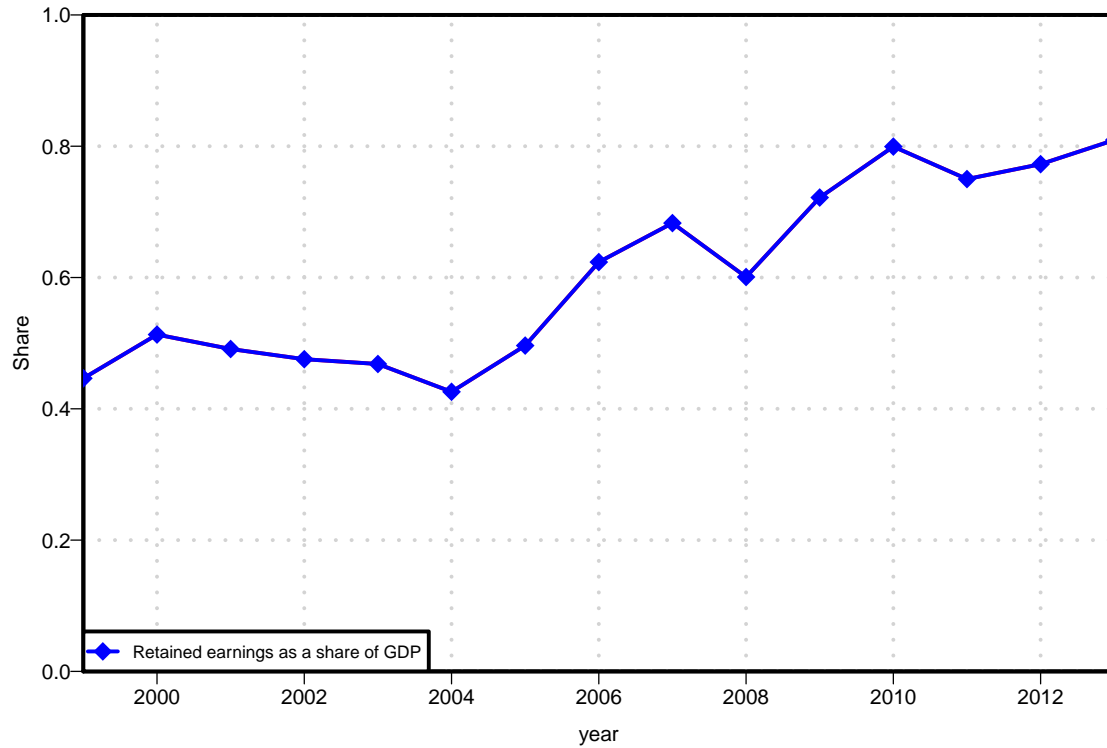


Figure 7: Aggregate profits, change in accumulated retained earnings and total dividends paid

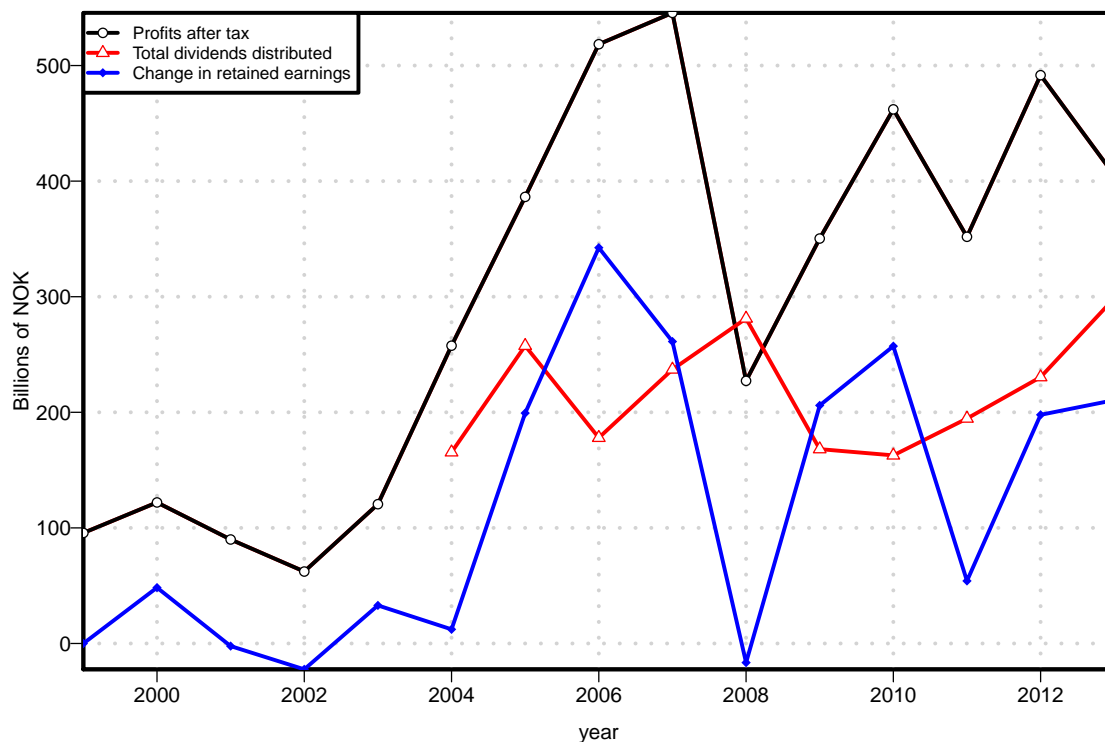


Figure 8: Aggregate change in accumulated retained earnings and individual capital gains and dividends

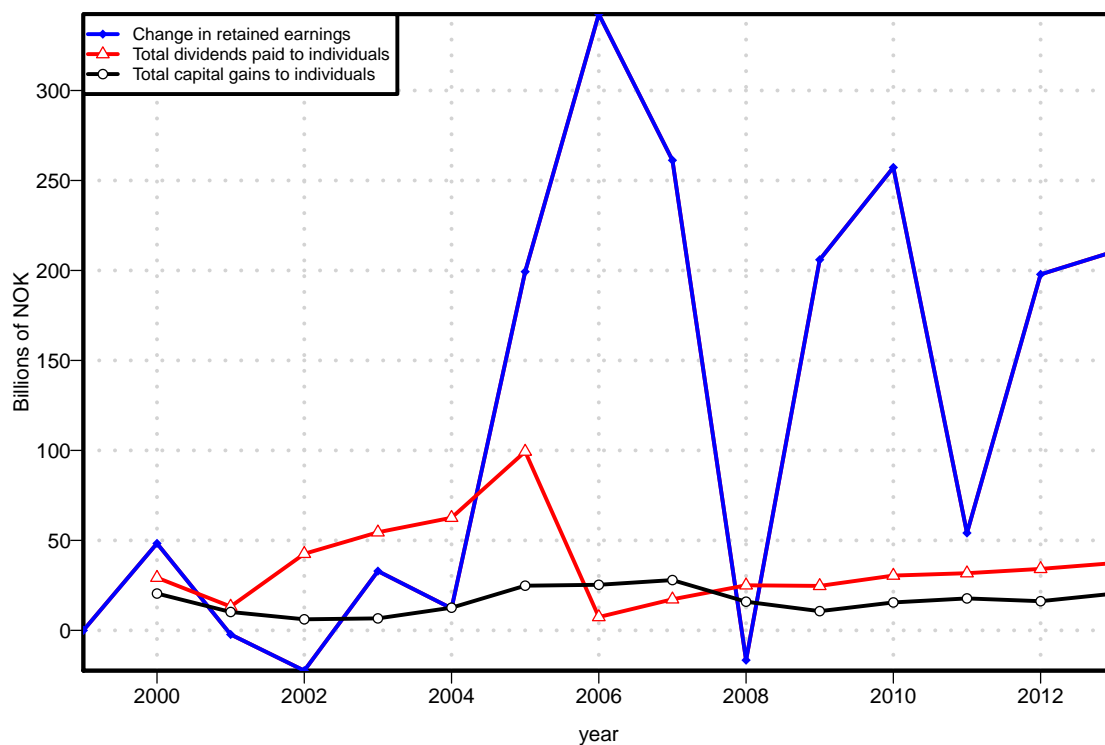


Figure 9: Composition of top 1% share

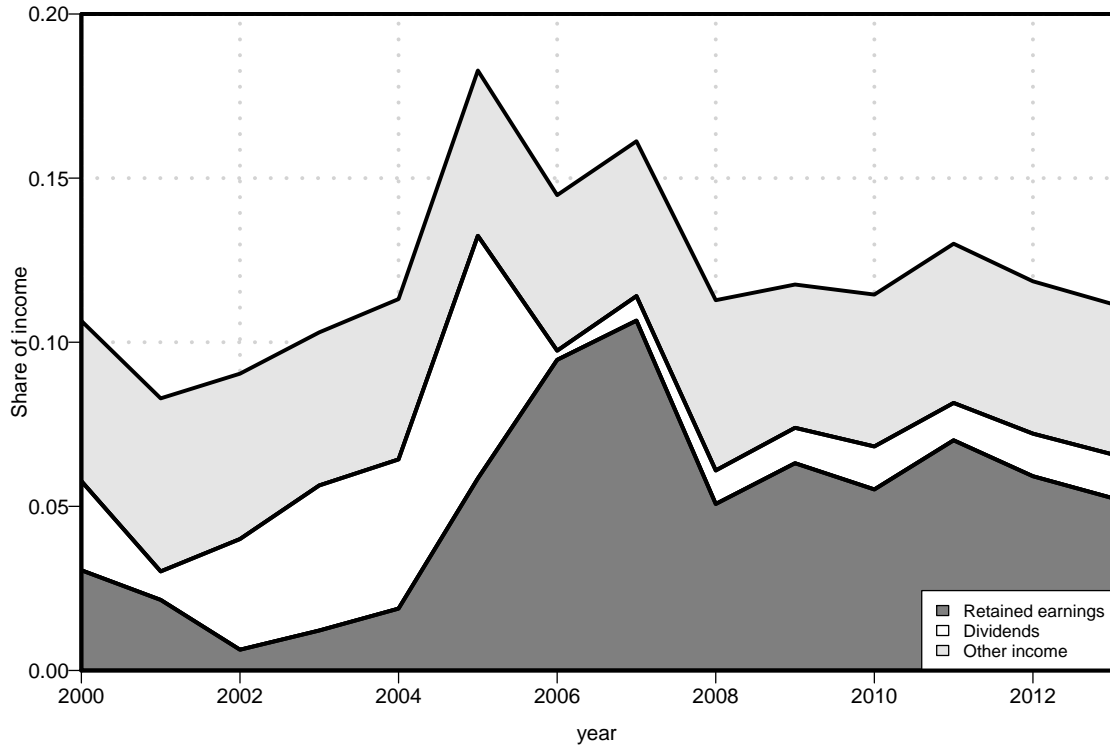


Figure 10: Composition of top 0.1% share

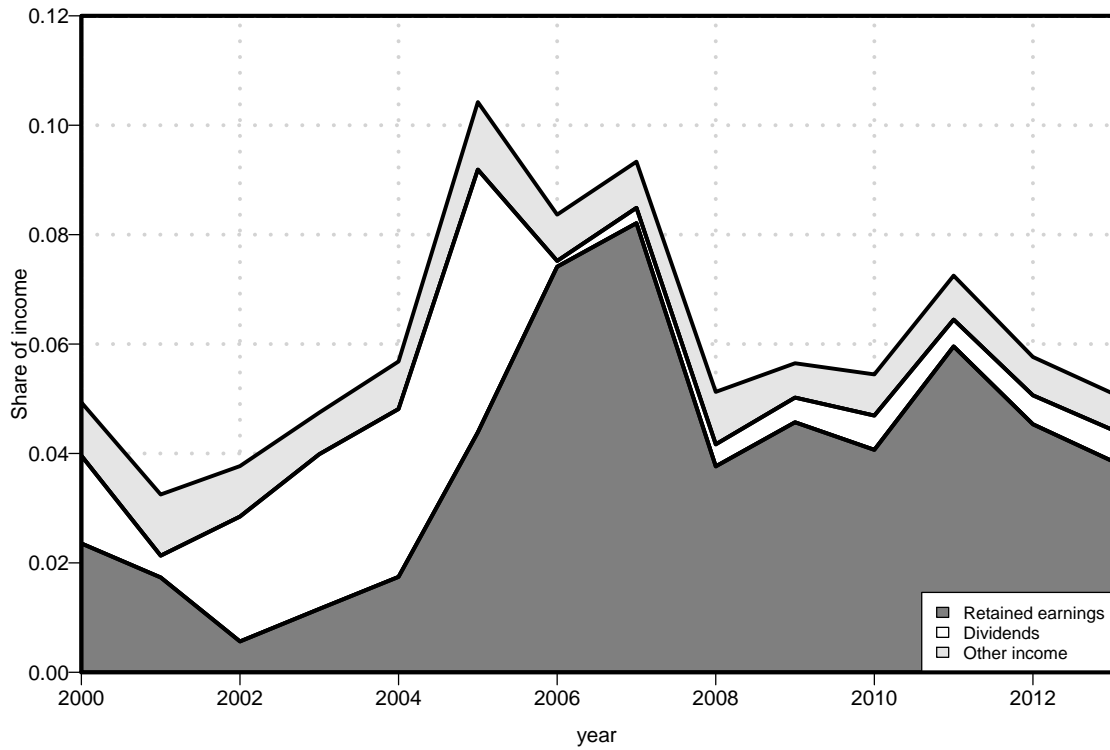


Figure 11: Accumulated retained earnings in the top 0.1% by number of owners

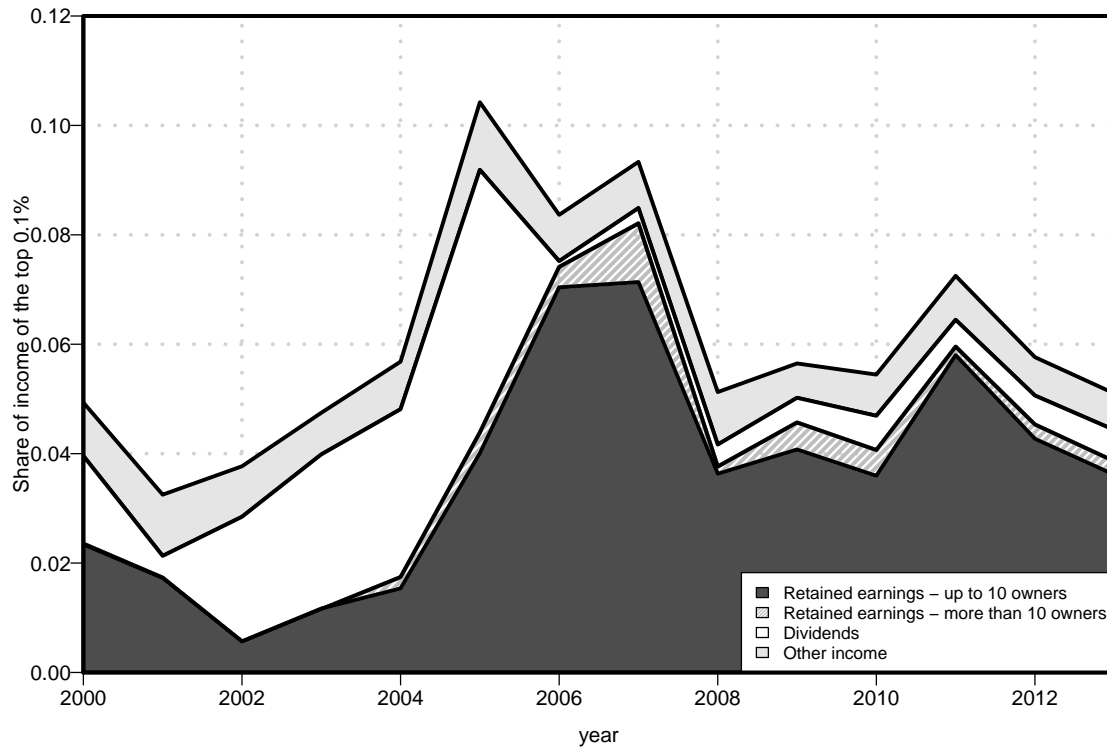


Figure 12: Accumulated retained earnings in the top 0.1% by ownership share

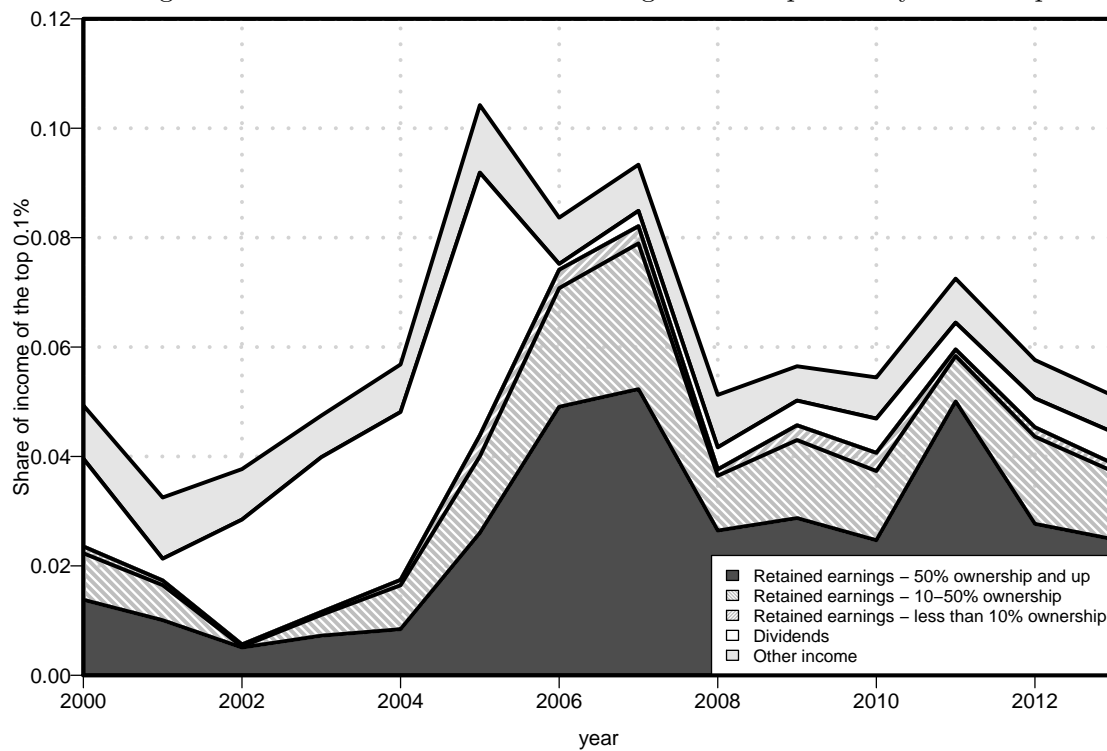


Figure 13: Accumulated retained earnings in the top 0.1% by direct/indirect ownership

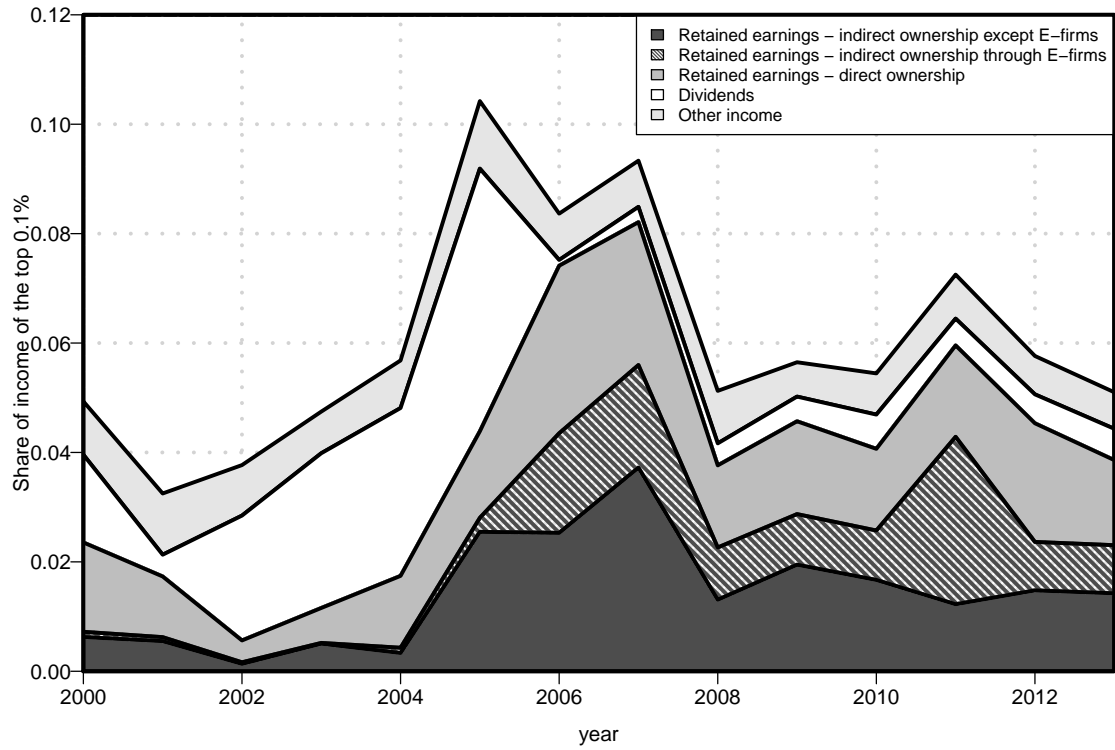


Figure 14: Mobility of top groups

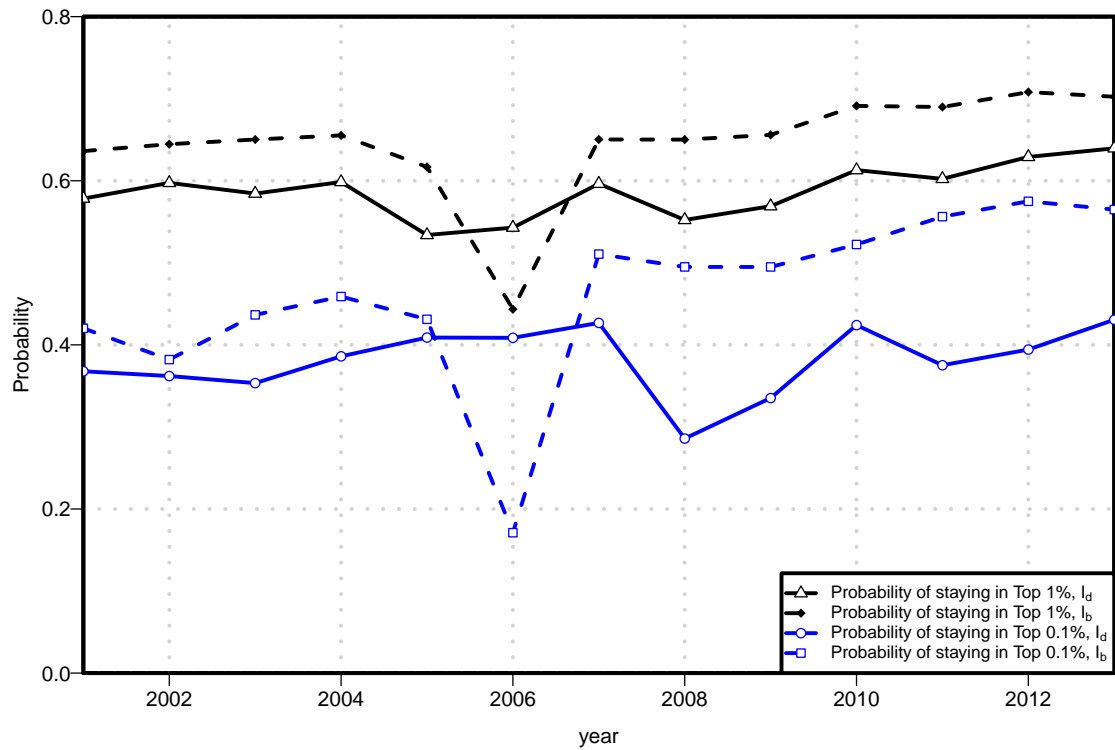


Figure 15: Membership in top groups under different definitions of incomes

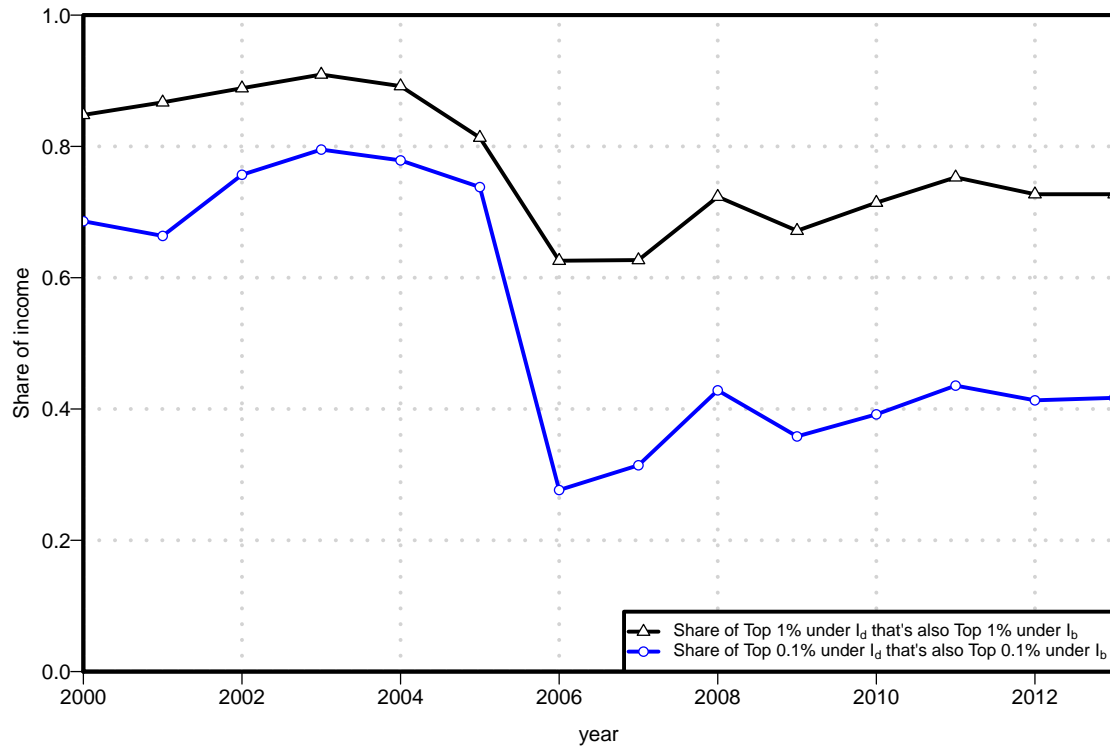


Figure 16: Imputation of retained income based on dividends

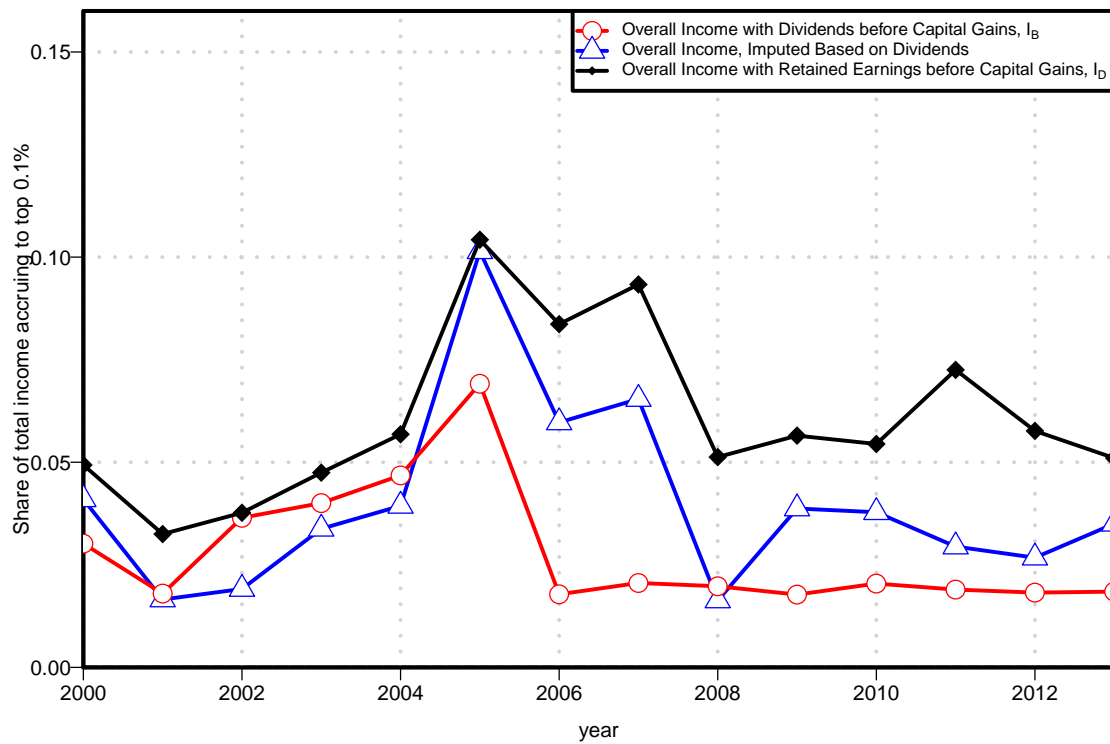


Figure 17: Dividends and changes in accumulated retained earnings in large economies

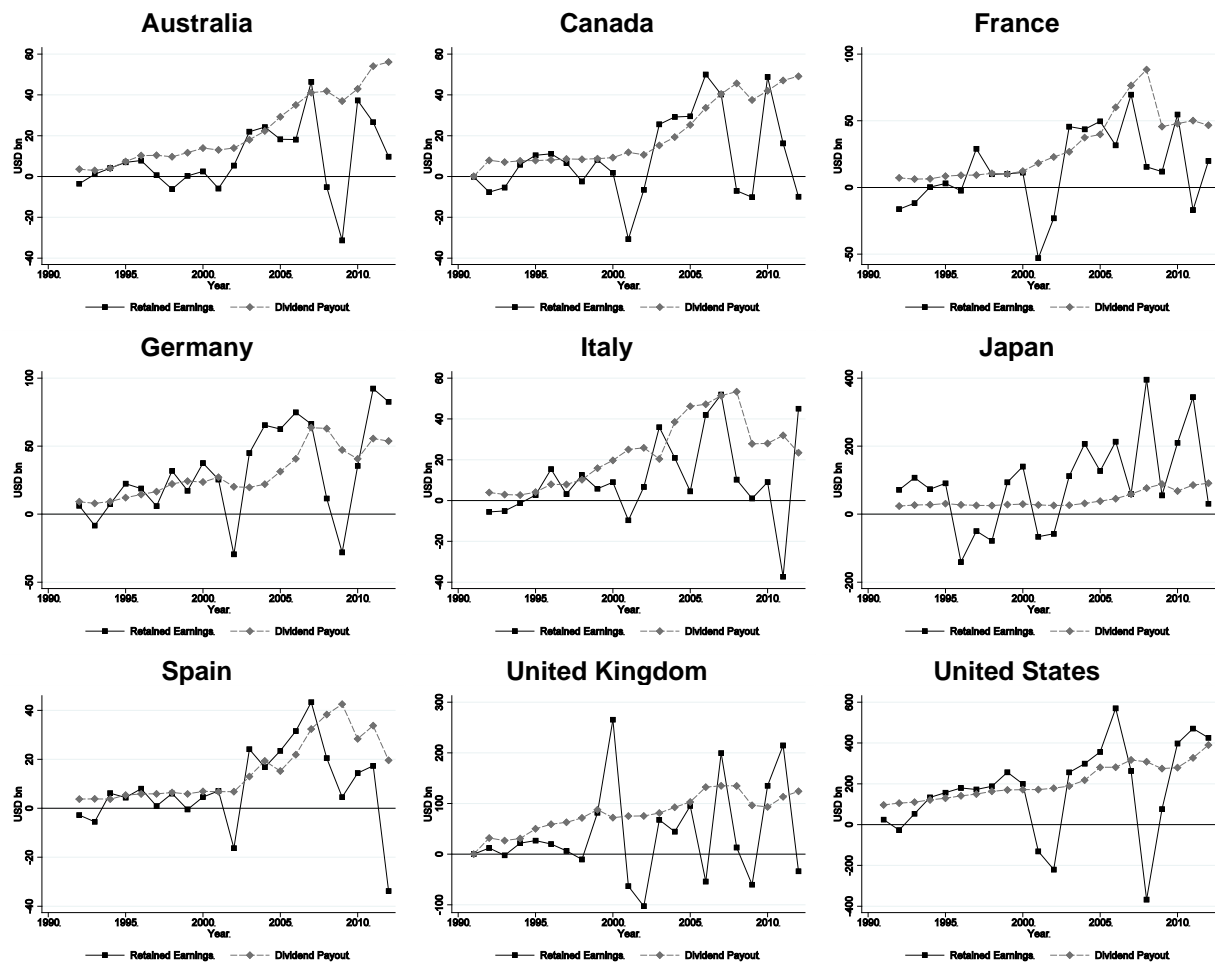


Table 1: Share of employment: Corporations vs. pass-through entities

Country	Share of Employment in		
	Sole Proprietorships	Partnerships	Corporations
Austria	22%	20%	58%
Belgium	9%	6%	85%
Bulgaria	12%	4%	84%
Cyprus	9%	6%	85%
Czech Republic	25%	5%	71%
Denmark	13%	5%	82%
Estonia	3%	2%	94%
Finland	5%	8%	87%
France	11%	58%	31%
Germany	18%	27%	55%
Hungary	13%	28%	59%
Ireland	12%	14%	73%
Italy	24%	22%	53%
Latvia	4%	15%	81%
Lithuania	12%	2%	87%
Luxembourg	4%	6%	90%
Malta	19%	10%	71%
Netherlands	12%	16%	72%
Norway	8%	7%	85%
Poland	42%	10%	49%
Portugal	19%	3%	78%
Romania	6%	1%	93%
Slovak Republic	26%	5%	69%
Slovenia	20%	2%	78%
Spain	21%	8%	71%
Sweden	12%	7%	80%
United Kingdom	6%	5%	89%

Figure A.1: Share of individuals in the top 1% who are shareholders of firms that maximize dividends

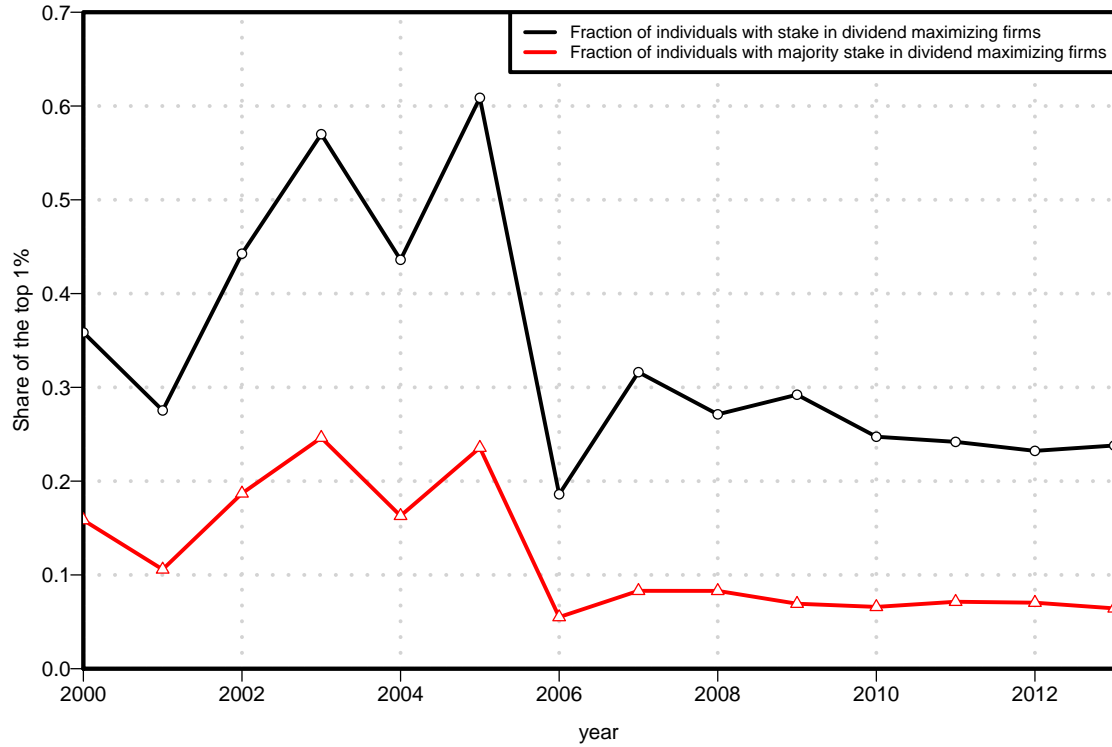


Figure A.2: Retained earnings and dividends by dividend-maximizing firms

