

Polish business flat tax and its effect on reported incomes: Preliminary analysis

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*Work in progress - very preliminary and incomplete
Not for distribution, citation and maybe even reading
Comments more than welcome*

03/12/2009

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²Draft prepared for the conference “Tax Policy Analysis Using Large Panel Data Sets of Tax Returns: An International Workshop” organized by the Office of Tax Policy Research, University of Michigan, Ann Arbor, March 13th 2009. Parts of this project are in cooperation with Artur Radziwiłł from the Center for Social and Economic Research (CASE) but all the errors and inaccuracies of the current version are the sole responsibility of the author. I am also grateful to Jaroslaw Neneman for help at multiple stages of the project and the discussion and to Tomasz Mazur and Tomasz Szałwiński for their help in obtaining access to and preparing the data. Center for Social and Economic Research provided administrative support in various stages of this project. Ben Marx and Rafał Pruchniak provided excellent research assistance. Financial support from Komitet Badań Naukowych

Abstract

This paper provides a preliminary analysis of the impact of the 2004 tax reform in Poland that introduced a broad-base low-rate “flat” tax for business income. The analysis relies on a large panel of tax return data. We find very large increases in reported business income concentrated among the existing business owners. These findings suggest that the reform had an important effect on taxable income. The reform and the data provide an opportunity to exploit a difference-in-difference strategy relying on the differential benefits from the reform among otherwise similar individuals due to the level of earnings of the spouse and pre-existing deductions. We suggest how this information can be further explored to provide formal and credible estimates of behavioral responses in this context.

(State Committee for Scientific Research), grant N113 041 32/3879, is gratefully acknowledged.

1 Introduction

In the last 10 years, a number of Eastern and Central European countries introduced so called “flat taxes.” Proponents of this type of taxation appeal to its significant benefits due to improved work economic activity incentives, reduced tax evasion and the size of informal economy. Opponents highlight a reduction in progressivity of the tax code as the main argument against this type of taxation. Despite significant popularity that this despite of taxation has enjoyed, evaluation of its effects has been limited (exceptions are Ivanova et al., 2005; Gorodnichenko et al., 2008).

A type of a “flat tax” has been and is considered as a potential direction of a reform of the tax code in Poland. It was a part of the program of the Civic Platform, the dominant party in the current coalition government. While widespread flat tax has not yet been introduced in Poland, a limited form of such taxation was introduced in 2004. The 2004 reform offered individuals engaged in business activity a choice between filing according to the regular progressive schedule or being subject to a fixed rate. The key benefit of relying on the flat rate schedule is the lower marginal tax rate: the flat tax rate is 19%, while the three-bracket progressive schedule involves three rates of 19%, 30% and 40%, with the top rate applying at 74,048zł in 2004.¹ There is a trade-off involved in electing the flat tax rate, with the cost having to do with elimination of tax deductions and credits and giving up income averaging opportunity for married individuals. We discuss the reform in more details in what follows.

The limited scope of the reform provides a unique opportunity to identify the impact of a flat tax on individual behavior. This is so, because individuals who are otherwise similar may be affected differently depending on their personal tax situations. For example, it is more costly for individuals with

¹This rate is of the order of \$20000 using the exchange rate in 2004 (1zł appreciated from 0.25\$ to 0.33 over the course of that year). The average salary in 2004 in Poland was 2,289zł per month or 27,468zł annually.

a high-income spouse to choose the flat tax regime due to its elimination of a possibility of joint filing and resulting tax averaging.² Similarly, the change did not apply to all types of income and hence provides an opportunity for identification based on comparing behavior of taxpayers with different income streams. Hence, one does not have to rely solely on the time variation but can further take advantage of the natural experiment that generates cross-sectional variation in the change in tax incentives.

Business income “flat tax” that was introduced in Poland is characterized by low marginal tax rate and broad tax base. We will not try to distinguish between the effect of those two dimensions of differences, although some empirical strategies to do so have been proposed (Kopczuk, 2005). As a result, we are estimating the joint impact of the two changes in the tax code.

Our objective in this work is to evaluate the impact of flat taxes on reported taxable income and try to infer the source of response. In doing so, we are advancing the knowledge of the responsiveness to tax incentives in a number of ways. We are estimating responsiveness of reported income in Poland. Results are of interest from from the Polish point of view but they are also of interest more generally. This is the first study applying to a middle-income country and, arguably, the first one applying to a situation with a significant informal economy. Hence, the estimated responses are likely to generalize better to lower and middle income countries than results obtained based on more advanced economies. On the other hand, entrepreneurial income is hard to tax even in advanced economies. For example, according to the IRS estimates of the tax gap in 2001, underreporting of business income accounts for approximately half of the individual income tax gap, corresponding to the underreporting rate of the order of 40% and exceeding 50% for non-incorporated businesses. Underreporting rate for all sources of income is

²There is no separate tax schedule for married individuals, instead the tax code allows for income averaging across spouses with tax liability of each spouses computed based on the half of joint taxable income.

estimated at 11%.³ Hence, finding of a significant reaction to changes in taxation of entrepreneurial income in a high-evasion environment is also of relevance for policy makers in high-income countries.

2 Data

The empirical approach takes advantage of individual tax return data from the Polish Ministry of Finance. The data covers period from 2002 to 2005 and includes all individual tax returns filed during that time by approximately 1.8 million individuals and their spouses (to the extent that they could be identified based on filing a joint income tax return), altogether a little bit over 10 million returns. Sampled individuals were selected randomly from among those who filed at any time during the period (the likelihood of being selected did not depend on the number of returns or the number of times that one filed). This procedure corresponds to selecting a random sample of the population and limiting it to those who filed at least once during the period.

Following the selection of the taxpayers, joint tax returns filed during 2002-2005 were used to identify spouses. All tax returns of spouses identified in that way were added to the dataset. Taxpayers who divorced or widowed and then remarried can have multiple spouses in the dataset and returns for each spouse will be available for all years. On the other hand, filing jointly is a choice and not a requirement so that not all couples can be identified and it is not possible to distinguish changes in election of how to file from divorces or deaths. Furthermore, and importantly given the reform studied, the flat tax does not allow for joint filing so that information about spouses of taxpayers who report business income only and use the flat tax schedule

³Between \$83 and \$99 out of the estimated individual income gap of \$150-187 billion (http://www.irs.gov/pub/irs-utl/tax_gap_facts-figures.pdf), misreporting rates based on http://www.irs.gov/pub/irs-news/tax_gap_figures.pdf, accessed on 2/12/2009.

is not directly available in 2004 and 2005 (but to reiterate, 2004 and 2005 tax returns of their spouses with whom they filed jointly in 2002 or 2003 are still available).

As usual with tax data, it is rich in details from tax returns (most of the lines from tax returns are reflected in the dataset) but relatively thin on demographic information (gender, age and population at the place of residence are available; presence of children and marital status are available to the extent that tax return reveals that information).

For the purpose of analysis in this note, we aggregate information from all tax returns filed by a given individual.

All personal information has been removed from the dataset so that taxpayers cannot be identified. Furthermore, numerical variables have been blurred to preserve confidentiality of the taxpayers. The blurring procedure was performed by selecting for each tax return a random number from a uniform distribution between 0.9 and 1.1 and multiplying all the monetary variables on a given tax return by that number. This procedure retains additivity of variables (for example, the sum of all income sources still aggregates to the total income) and preserves means of estimated variables. Multiplicative transformation also guarantees that the blurring procedure affects the logarithms of variables in an easy to understand way. In this version of the paper, blurring is ignored and results are discussed as if the actual data was observed, accounting for this issue is work in progress.

3 Polish tax system

The regular income tax in Poland has been in effect since the early 1990s and has a fairly typical progressive structure. The basic rate structure of the tax remained fairly stable since the late 1990s. There are three tax brackets with marginal tax rates of 19%, 30% and 40%. There is also a non-refundable tax credit applicable to everyone that effectively implements an exemption

from tax for low levels of income. Between 2002 and 2006, tax brackets were fixed in nominal terms, at 37024 zł and 74048 zł. The tax credit was equal to 518.16zł in 2002 and adjusted to 530.08zł for 2003-2006.

The introduction of the choice between the progressive rate rate schedule and the fixed rate (19%) for non-agricultural business activity came into force on 1 January 2004 as an amendment to Personal Income Tax Act. The fixed rate option was available for persons who were already conducting business activity. They needed to inform appropriate tax office about their choice with a statement by January 20th. The option was also available for those starting their business in 2004. However, individuals, who intended to provide services to their last-year employers, could not choose this form of taxation. Choice made by taxpayer was effective in subsequent years, unless the resignation was filed with the appropriate tax office.

A taxpayer who had both business and other types of income and who chose to elect a flat-tax regime, would have to file two (or more) separate tax forms corresponding to different types of income, with taxation of business income and taxes imposed on other types of income computed independently.

Taxation of business income in Poland depends on the organizational form of the business. Sole proprietorships and partnerships without limited liability are pass through entities with all income allocated to owners. Partnerships with limited liability and corporations are subject to the corporate income tax (CIT). The CIT rate was 28% in 2002, it was reduced to 27% in 2003 and subsequently reduced to 19% in 2004 (at which level it stayed since). An owner of a firm that is subject to the CIT does not receive business income that could be taxed using the flat tax.

Capital income, including dividends from firms subject to CIT, is subject to a flat 19% rate and is taxed separately from other types of income (the tax was introduced in 2001). Hence, opting for a standard limited liability structure closes the option of taking advantage of the flat tax and exposes income to double taxation through both CIT and capital income tax. Nev-

ertheless, reductions in the CIT rate in 2004 should lead to a reduction in business income reported on individual income tax returns and bias against finding an effect of the reform.

The tax law appears to draw a clear links of business income associated with limited liability and being subject to CIT, seemingly implying that only income from businesses that are not accorded limited liability can be subject to the flat tax. In practice, this is not the case though. Polish law allows for a hybrid form of an organizational structure called “spółka komandytowa.” This type of structure requires that some partners have limited liability and some do not. Critically for tax purposes, it acts as a pass-through entity, i.e. there is no tax on the partnership level and instead income is allocated and taxed at the partners’ level. Income of an individual who is a limited liability partner in a firm of that kind can be still taxed using the flat tax schedule. Furthermore, the full liability partner can be another firm, for example a limited liability partnership. The full liability partner can hold a minor stake in the business (e.g., 1%). Hence, this kind of structure effectively allows for limited liability (if the full liability partner has limited liability itself) with majority of income being subject to personal income tax as business income, in particular allowing for the flat tax election.

Since the early 1990s, there have been two additional ways of taxing businesses called *karta podatkowa* (tax card) and *ryczałt* (presumptive tax) that were fairly limited in their reach and applied to very small businesses of particular kinds specified by the law. The “*tax card*” is essentially a lump-sum tax in the amount specified by the local tax authorities. *Ryzałt* is a proportional tax applicable to revenue from certain types of business activity. The rate depends on the type of business. This type of taxation does not allow for deducting costs or for taking advantage of any deductions (*need much more discussion, it is in the data but small and with no evidence of response in 2004*).

Businessmen covered by fixed tax rate faced several disadvantages. They

had no right to joint taxation with spouse and could not be subject to preferential taxation for lonely parents. They also had no rights to tax relief other than deduction of contributions for social and health insurance (unless these they were included as costs of business activity). Opting for fixed rate eliminated the possibility of claiming the otherwise universal nonrefundable tax credit. These taxpayers were could not longer benefit from continued deductions obtained in previous years such as construction expense and student employment deductions as well as special privileges in special economic zones). Tables 1 and 2 show the full list of deductions and credits lost by taxpayer switching to flat tax.

Significant changes were made in the catalogue of exemptions and deduction from tax, effective on January 1, 2004. Almost all tax deductions existing under the previous tax rules have been abolished with the exception of the three-year repair and modernization tax relief, which was continued to apply for the period 2003-2005. These abolished deductions included expenses for children transportation to schools, for increasing qualifications and professional training, for higher education and for purchase of study materials. Lump-sum payments for local trips were also not deductible anymore. The value of non-alcoholic beverages and meals provided to employees as well as the value of vouchers, coupons, tokens, or other means which could be exchanged for these products also ceased to be the subject of deductions. In 2004, the single largest taxable income deduction for housing construction for rent was terminated. Tax income deductions for fees/dues to organizations of obligatory membership were also abolished. Taxable income deduction for donations to religious public benefit causes were limited to PLN 350 as opposed to 15% of income beforehand. Finally, the level of the statutory tax deduction for income earned from employment contracts and other legal positions to which such rules apply (e.g., management service contracts, directors' fees, etc.) were capped at PLN 102.25 per month, and no more than PLN 1,227 per tax year.

In May of 2004, Poland joined the European Union... effect on business income...

4 Summary statistics

Table 3 contains summary statistics for some basic variables. The number of individuals varies very slightly over time. The data shows an upward trend in wages, business income, gross income, taxable income and tax liability, and a flat pattern of deductions. Perhaps the most striking is the growth in reported business income that increased by over 30% between 2003 and 2004, and another 10% in 2005. This is consistent with the reform having an effect on reported business income.

The second panel contains information about those filing as single. There is an increase in the number of individuals who are single filers, again between 2003 and 2004. Note that married individuals who switch to a flat tax schedule, no longer file jointly resulting in additional single tax returns. Consistently with the flat tax schedule having an impact, there is a clear increase in the level of business income reported. This increase in business income is responsible for most of the growth in gross and taxable income as well.

The following two panels show information for individuals who file jointly: both those who were selected in the sample and their spouses. Characteristics of both groups are very similar, as expected, because the sampled individuals are randomly selected. Correspondingly to what was evident for those filing as single, the number of married individuals and their business income drops after 2003, although the increase in wages continues. On balance, gross and taxable income for that group are relatively flat over the period.

Panels 5 and 6, split couples along the income level showing separately summary statistics for the higher and the lower income spouse. There is a large disparity in incomes of spouses, with average for higher earnings spouse

three times greater than income of lower earnings spouses. Business income is heavily concentrated among higher earning spouses and shows familiar decline after 2003. Lower earning spouses receive a disproportionate share of their income from sources other than wages or business.

The final two panels show summary statistics for a subset of individuals who are present in the data for the full four years. While this is no longer a representative sample of the full population, it has an advantage of being free of compositional changes from one year to another. About 80% of individuals are observed every year. They have higher wages and business income than those who are not filing regularly and show similar temporal pattern as the overall sample with a discrete jump in reported business income in 2004. In the final panel of Table 3, we show summary statistics for those observed in all four years who have ever filed a joint tax return. Because we observe marriage directly only if a joint return is filed and joint returns may not be filed by some individuals after 2004 due to relying on a flat tax schedule, this is an alternative way of focusing on a stable sample of those who are with high likelihood married. As expected, married individuals have higher income on average and now show the same dramatic growth in business income between 2003 and 2004. There is suggestive evidence that business income has increased between 2003 and 2004 and that this effect is associated with the decline in joint returns and an increase in single returns.

Table 4 provides further background statistics by cutting the data into three categories based on the level of taxable income. Taxable income categories correspond to the thresholds in the tax schedule, although this is not a direct match to the progressive code: data is aggregated across all different tax returns including flat tax, capital income, tax card and *ryczalt*. For married individuals, taxable income is defined here as the average of taxable incomes of the two spouses to approximate the actual tax treatment. There is no evidence of any significant changes in the structure of incomes in the lowest bracket. There is however a clear evidence of a very large decline in

the average business income in the intermediate bracket. There is also an increase of the number of individuals who are in the second bracket. Most interestingly, business income reported in the highest bracket increases by 50% and the number of individuals in that category also increases by about 50%. At the same time, the average wage in that bracket actually declines. This can correspond to conversion of wages into business income but it may also be an artifact of the changing composition of that group. Reliance on deductions among the highest income taxpayers drops precipitously, again consistently with the effect being drive by flat-rate schedule that eliminates most deductions.

Overall this simple descriptive evidence suggests that there were significant changes in the structure of tax returns between 2003 and 2004. The overall reported business income has increased and the prevalence of single filing also increased. Business income reported on joint tax returns decreased very significantly, suggesting that the substantial chunk of income previously subject to the progressive tax shifted to the flat tax. Furthermore, these changes occurred in particular parto of the income distribution, with the number of individuals with income classifying them for one of the two top brackets significantly increasing. The increase in business income corresponds is only visible at the top of the distribution

5 Effect of the reform on business activity and taxable income

We now turn to a more detailed but still descriptive analysis of the effect of the flat tax introduction on taxpayers' behavior. Table 5 shows basic variables for taxpayers who *chose* to take advantage of the flat tax schedule in 2004 and 2005, as well as those who only did so in one of those years. Approximately 12500 out of 1.4 million regular filers chose to file a flat tax return in 2004 and the additional 3600 did so in 2005. While, this is only

about 1% of all taxpayers, these are predominantly very high income taxpayers. The average gross income of those who filed form PIT-36L in both 2004 and 2005, was already 120000zł in 2003 — well above the threshold for the top tax bracket although below the average income in that bracket. The average gross income in 2005 was over 200000zł and about equal to the average in the top bracket. Between 2003 and 2004, business income of those taxpayers increase by almost 60% and it increased by another 8% in 2005. A similar jump but from a lower basis is also evident between 2004 and 2005 for those who chose to file according to the flat tax schedule in 2005 only. Taxpayers who were on the flat tax schedule in 2004 only did not experience much of an increase between 2003 and 2004 and actually show a decline in their incomes in 2005.

These results are suggestive of a reform having an effect on reporting but they fall short of establishing causality. It is clear that business income for taxpayers who chose to file according to the flat tax schedule started increasing even before the reform while their wage income had already been declining. A taxpayers who are on an increasing income trajectory may be more likely to have higher income in the future and therefore more likely take advantage of new provisions that are beneficial to taxpayers with high income. This effect produces an association between taking advantage of the reform and income growth but it is not a causal relationship.

In Table 6, we eliminate one source of selection into the flat tax by focusing on individuals who owned a business throughout the whole period. 22% of this group switched to a flat tax in 2004 and additional 6% did so in 2005. The same temporal pattern of reported business income as before is evident for the whole group, suggesting that selection effects are not driving it (although this is still a selected sample: these are individuals who were able to stay in business throughout the period).

The bottom panel of the table shows some information about the spouses. The middle panel shows information based on joint tax returns. Because

taxpayers who are relying on a flax tax can no longer claim jointly (unless they have other sources of income), the spousal variables after 2003 are based only on those who continued to file jointly. To address this issue, the following panel uses an alternative definition of the spousal variable. Instead of relying on the current spouse, the spouse is defined as a person with whom a joint tax return was filed in both 2002 and 2003, regardless of whether a joint return was filed in 2004 or 2005. Business income reported by spouses has increased significantly as well and so did wage income. This suggests that, as a first pass, the bulk of the response did not have to do with reallocation of income between spouses. It is also interesting to point out here that the election of a flat tax may change the marginal tax rate face by the spouse (especially, lower income spouse) and affect the behavior of the spouse directly through that channel.

A margin of response that we have ignored so far has to do with a change in occupation. Taxpayers may choose to start a business when incentives for reporting business income improve. However, the number of individuals actually reporting business income slightly declined between 2003 and 2004.⁴ While this is not a definitive evidence, it suggests that the apparent strong responses discussed before do not have their source at this margin.

6 Estimating the causal effect of the reform

We pursue perhaps the simplest approach to estimating the effect of the reform by exploiting differences in its impact on various categories of individuals. Conceptually, we will estimate specifications of the form:

$$\Delta \ln(y_{it}) = \alpha \Delta L_{it} + \beta X_{it} + \Delta \varepsilon_{it}$$

where y_{it} is the variable of interest, for example gross income or taxable income, L_{it} is a dummy variable for being subject to the flat tax regime and

⁴The number of individuals reporting business income in the dataset in 2002-2005 was 72883, 72206, 71518 and 71072 respectively.

X_{it} is the set of controls, and the equation is already expressed in the first-differenced form. This is analogous to specifications estimated elsewhere in the taxable income literature with the dummy for being subject to the new tax regime replacing the marginal tax rate. The key variable is L_{it} and it is of course endogenous. We will pursue simple IV strategy based on constructing an indicator for a groups that is likely to be take advantage of the reform and that is arguably pre-determined. We will usually estimate this specification in first-differenced form. The error term in this specification ε_{it} is in general complicated and reflects variety of factors that are not modeled here. In particular, it contains individual-specific but unobservable characteristics that are likely to influence the desire to take advantage of the reform (such as for example, risk aversion). Including individual fixed effect or first-differencing is one possible approach for removing this source of bias. The error term is also likely to reflect individual earnings dynamics and is likely to be autocorrelated. This type of error is likely to be correlated with the likelihood of taking advantage of the reform: for example, individuals who have temporarily high income may take advantage of the reform introducing correlation between the variable of interest and the instrument.

We seek instruments that would influence the likelihood of taking advantage of the flat tax regime while not being related to the error term ε_{it} . We will rely on pre-determined variables as of 2002. In the first strategy, we will use as an instrument owning a business in 2002 as an instrument. It is natural to expect that owning a business prior to the reform would influence the likelihood of taking advantage of the flat tax. Being a business owner is an endogenous decision and factors that influence that decision are likely to enter the error in the income equation, ε_{it} . Many of such factors can be reasonably expected to be constant characteristics of an individual and hence eliminated by first-differencing. However, owning a business is a decision that may change over time and may influence earnings dynamics hence introducing a correlation between owning a business and income changes in

the future. Following taxable income literature (Moffitt and Wilhelm, 2000; Gruber and Saez, 2002; Kopczuk, 2005) that stressed the importance of controlling for mean reversion and other sources of transitory income dynamics, we will include the log of gross income (or taxable income, depending on specification) to proxy for such transitory effects. In some specifications we will also control for the spline of gross income. While the literature sometimes makes a distinction between controlling for the transitory dynamics and overall trends in earnings inequality, the approaches that have been proposed require multiple lags of income to control for it and given the short span of the panel are not feasible here.

Conceptually, this approach corresponds to a very simple difference-in-difference strategy where individuals who owned a business in 2002 are considered a treatment group and those who did not are considered a control group. This is most easily visible if we consider a three-year difference where a change in income between 2005 and 2002 is used as the left-hand side variable. In a reduced-form regression, this change would be regressed on owning a business in 2002, corresponding to a difference-in-difference estimate of the “intent to treat” effect. Switching to a flat tax is the actual realized treatment and the IV strategy attempts to estimate the effect of this treatment. When one-year differences are used, identification of the flat tax effect hinges on differences in behavior between 2003 and 2004 for those who owned business in 2002, with 2002-03 and 2004-05 differences used mainly to help in identifying other coefficients (most importantly, the effect of first-period earnings reflecting earnings dynamic effects).

Using the presence of a business in pre-period as an instrument amounts to using other types of income as a control for business income. We will attempt two other instrumental variable approaches. First, we will use a dummy for being in the second or third bracket in 2002. Because the tax rate in the first bracket is the same as 19%, only individuals who have enough income to fall into the second bracket or above might find it worthwhile to

switch to the flat tax. Being in the higher bracket to begin with is plausibly correlated with taking advantage of the reform. This strategy corresponds to using relatively low income individuals as a control group.

The final strategy exploits the fact that there are disadvantages from switching to the flat tax. In particular, individuals lose the possibility of filing jointly with the spouse. This is more costly if there is a large disparity in incomes. Holding income of the taxpayer constant, if the spouse has high income, then switching to the flat tax results in giving up income averaging possibility and increases tax liability on the spousal income. To the contrary, if the spouse has low income, then switching reduces tax liability on spousal income. Hence, being a higher income spouse is likely to increase the likelihood of taking advantage of the reform. This strategy amounts to using as a treatment group those with low income spouses and a control group individuals with high income spouses.

Various instruments can be naturally combined, so that we might pursue comparisons between business owners with high and low income spouses by interacting the corresponding indicators.

Results are presented in Tables 7 and 8. Table 7 contains results based on regressing gross income on the flat tax dummy, while Table 8 contains estimates of the effect on taxable income. The results are very similar, reflecting relatively small role played by deductions in the Polish tax code. Given this similarity and the fact that the definition of taxable income is different for those on the flat tax schedule than for those not on it, I focus on the gross income results. Unless otherwise specified, I control for year dummies, age and the log of gross income in the initial period. Reported standard errors are clustered on the individual level. Given large sample sizes, all results are very comfortably statistically significant with robust first stages.

The first specification contains the fixed effects estimate with the endogenous flat tax dummy as a regressor. Being on a flat tax is associated with 0.27 log points increase in the level of reported gross income. This estimate

cannot be interpreted as causal though as the decision to switch to the flat tax is under control of a taxpayer. The following specifications pursue variants of difference-in-difference approach discussed above.

Using non-business owners as a control group for business owners yields an estimate of the tax reform effect of 1.12. Other strategies result in even bigger effects. In particular, relying on the lower brackets as the control group yields estimates of about 4, and the same is true when being in a high bracket is interacted with having income higher than the spouse — way too large to be believable, *think about what's wrong — why are low brackets a poor control group?*

The estimates are smaller when we focus on three-year differences. This is possibly reflecting the fact that shorter-term responses may partially reflect income shifting between pre- and post-reform years.

The estimates are also reduced when we further focus on individuals who are married in both 2002 and 2003. This is a more stable sample. As documented in Kopczuk (2005), the results in the U.S. taxable income elasticity context are sensitive to inclusion of single individuals, perhaps reflecting difficulty in controlling for short-term earnings dynamics of individuals who are relatively young or old. Nevertheless, the estimates remain large with the estimated effect based on the presence of a business at 0.65, corresponding to the flat tax reform almost doubling reported income. While this is a very large effect, it is in line with the magnitude of the effect visible in Table 5. The effects at three-year horizon are somewhat smaller as before but still large and very significant.

The penultimate specification restricts the sample to those individuals who in 2002 owned a business and were in the second or third bracket. Within that group, I use being a higher-income spouse as an instrument for switching to the flat tax. This instrument has a strong first stage: begin a higher income spouse increases the likelihood of switching by 7 percentage points. The estimated effect of the flat tax regime is 1.02 and very significant.

This is perhaps the most demanding strategy as it focuses on the subset of individuals who are high income business owners and relies instead on the characteristics of the spouse for identification. It produces results very much in line with other approaches.

The final specification uses 10-piece spline of log gross income rather than log gross income itself to control for transitory effects and potential differential inequality changes. Otherwise, this specification is identical to that in the second row. This modification reduces estimates somewhat but they remain very large.

7 Conclusions

In this paper we present a preliminary analysis of the impact of the 2004 Polish tax reform on economic behavior. The reform introduced a low-rate broad-base option for reporting income by business owners. We found that there was a dramatic increase in the amount of reported business income that occurred as a result. This increase appears driven by the existing business owner who report more income on the tax returns. It is still an open question, awaiting more thorough analysis, to determine what is the nature of this response: does it reflect business activity or increased compliance. We have also not yet sufficiently explored the cross-sectional dimension of the data. The nature of the reform created differential incentives for switching to a flat rate schedule depending on one's reliance on tax deductions and credits and depending on the potential benefits from joint filing.

In our ongoing work, signalled in Section 6 of this draft, we pursue the approach introduced by Feldstein (1995) who focused on estimating the responsiveness of taxable income to changes in the tax rates. This context is a natural candidate for this kind of study and holds promise to deliver results that are of greater relevance for lower income countries than those produced by the literature on the elasticity of taxable income to date. Studies that

are based on the US data initially found large responsiveness (Lindsey, 1987; Feldstein, 1995; Auten and Carroll, 1999), but more recent work in this area has shown that these results were due to insufficient controlling for income widening and mean reversion so that the actual elasticities are quite moderate (Gruber and Saez, 2002; Kopczuk, 2005). While findings for other countries are broadly consistent with those for the US (Sillamaa and Veall, 2001; Aarbu and Thoreson, 2001; Bianchi et al., 2001), there are enough differences to support the argument of Slemrod and Kopczuk (2002) that taxable income elasticities are not in fact primitive parameters having its source in preferences and technology but they also reflect administrative aspects of the tax code. For that reason, analysis in additional countries and additional contexts is of interest not only in those particular places but more generally it helps in understanding the nature and determinants of such responses more generally.

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Table 1: Income deductions in 2004

Income deductions	2004
Rehabilitation deduction	
- personal guide	2280 zł
- dog guide	2280 zł
- prescribed drugs	above 100 zł/month
- passenger car	2280 zł
Deduction for person taking care of handicapped	9120 zł
Non-religious public interest donations	350 zł
Religious non-charity and charity donations	350 zł
Church charity donations	No limit
Housing deductions – continued since before 1997	
- house/apartment construction/expansion	Cumulative up to 189 000 zł
- continued expenses - construction and repair and related systematic saving	Cumulative expenses unaccounted in 2003
Mortgage interest for new housing	Interest on principal 189 000 zł

Table 2: Tax credits in 2004

Tax deductions	2004
Minimum income (below first tax threshold)	530,08 zł
Housing repair and modernization (2000-2002/2003-2005)	
- apartment	19% of expenses but not more than 4725 zł
- housing	5670 zł
- gas installation	945 zł
- minimum	567 zł
Housing deductions continues since before 2002 r. but not beyond 2004	
- construction deduction	19% of expenses but not more than 35 910 zł
- land purchase	value of 350m ²
- related systematic saving	30% of expenses but not more than 11 340 zł
Public interest organization donations	1% of tax due on tax form
Student employment deduction - continued since before 2004	discretionary

Table 3: Summary statistics

Variable	2002	2003	2004	2005
(1)	(2)	(3)	(4)	(5)
Number of observations	1659974	1646963	1639355	1639028
Wages	8872	8880	9161	9691
Business income	1555	1604	2135	2371
Deductions	106	109	88	129
Gross income	15792	16015	17050	17969
Taxable income	13983	14207	15366	16189
Tax liability	2437	2486	2617	2796
Filing independently				
Number of observations	924545	919220	930117	930074
Wages	6022	6014	6332	6757
Business income	839	869	2853	3333
Deductions	79	82	72	100
Gross income	12949	13107	15596	16651
Taxable income	11673	11834	14401	15355
Tax liability	1978	2018	2464	2669
Filing jointly				
<i>Sampled individuals</i>				
Number of observations	735429	727743	709238	708954
Wages	12455	12501	12870	13541
Business income	2454	2531	1193	1109
Deductions	140	143	110	167
Gross income	19366	19687	18956	19699
Taxable income	16887	17205	16631	17284
Tax liability	3015	3078	2818	2962
<i>Spouses of sampled individuals</i>				
Wages	12296	12296	12653	13232
Business income	2361	2425	1151	1061
Deductions	142	144	111	167
Gross income	19233	19411	18739	19400
Taxable income	16782	16962	16451	17006
Tax liability	2997	3005	2768	2888

(1)	(2)	(3)	(4)	(5)
<i>Higher income spouses</i>				
Wages	19400	19381	19894	20795
Business income	4286	4417	2139	1989
Deductions	249	251	191	293
Gross income	28868	29096	27731	28691
Taxable income	25257	25498	24385	25220
Tax liability	4546	4579	4121	4309
<i>Lower income spouses</i>				
Wages	5517	5612	5847	6287
Business income	620	635	240	219
Deductions	35	36	28	40
Gross income	9966	10253	10173	10695
Taxable income	8618	8888	8884	9323
Tax liability	1526	1567	1514	1608
Always observed individuals				
Number of observations	1395355	1395355	1395355	1395355
Wages	9567	9768	10116	10521
Business income	1711	1799	2420	2694
Deductions	111	118	97	146
Gross income	16778	17411	18737	19706
Taxable income	14822	15420	16884	17759
Tax liability	2600	2719	2905	3095
Always observed ever married individuals				
Number of observations	785416	785416	785416	785416
Wages	12252	12376	12698	13116
Business income	2276	2395	3145	3493
Deductions	129	136	106	165
Gross income	19101	19667	21130	22211
Taxable income	16648	17199	18792	19816
Tax liability	2951	3064	3244	3459

Table 4: Summary statistics by taxable income categories

(1)	Variable	2002 (2)	2003 (3)	2004 (4)	2005 (5)
<i>Taxable income not greater than 37024</i>					
	Number of observations	1591678	1575739	1560880	1550297
	Wages	7403	7329	7415	7674
	Business income	607	611	528	524
	Deductions	87	90	88	123
	Gross income	13199	13318	13575	13973
	Taxable income	11645	11778	12075	12395
	Tax liability	1798	1822	1874	1940
<i>Taxable income $\in (37024, 74048]$</i>					
	Number of observations	54910	57315	61493	68960
	Wages	37994	38018	39876	41093
	Business income	10420	10093	7846	7284
	Deductions	228	218	74	208
	Gross income	55526	55312	54735	55116
	Taxable income	48521	48395	48183	48263
	Tax liability	9924	9890	9704	9726
<i>Taxable income greater than 74048</i>					
	Number of observations	13386	13909	16982	19771
	Wages	64161	64595	58330	58338
	Business income	77808	79024	129131	130031
	Deductions	1878	1779	171	335
	Gross income	161110	159540	199958	201745
	Taxable income	150250	148552	199028	201856
	Tax liability	47683	47179	45231	45763

Table 5: Flat tax taxpayers

(1)	Variable	2002 (2)	2003 (3)	2004 (4)	2005 (5)
<i>Always observed individuals on flat tax in 2004 and 2005</i>					
	Number of observations	11869	11869	11869	11869
	Wages	8032	6998	6187	6517
	Business income	104827	116347	180971	190412
	Deductions	1608	1644	27	61
	Gross income	119786	128743	191587	204612
	Taxable income	111215	120453	186582	204188
	Tax liability	33543	36550	35912	39958
<i>Always observed individuals on flat tax only in 2005</i>					
	Number of observations	4475	4475	4475	4475
	Wages	12301	11856	10310	8261
	Business income	27316	31769	48836	85387
	Deductions	377	365	106	61
	Gross income	44441	48529	64293	98063
	Taxable income	39345	43108	58957	93128
	Tax liability	9355	10380	15307	18212
<i>Always observed individuals on flat tax only in 2004</i>					
	Number of observations	781	781	781	781
	Wages	11221	9648	10427	14299
	Business income	44782	47822	49679	16761
	Deductions	614	430	6	129
	Gross income	61300	62670	65309	38247
	Taxable income	55821	57116	61271	33857
	Tax liability	14783	15376	12229	9576

Table 6: Individuals reporting business income for all years

Variable (1)	2002 (2)	2003 (3)	2004 (4)	2005 (5)
Number of observations	42653	42653	42653	42653
Wages	6395	6117	6328	6778
Business income	45818	49016	64803	70225
Deductions	566	576	60	122
Gross income	55522	58687	74871	81024
Taxable income	50021	53451	70852	77047
Tax liability	12436	13486	13561	14742
% on flat tax	0.00	0.00	0.22	0.28
<i>Spousal variables</i>				
Number of observations	26762	26769	20437	18817
Wages	11566	11706	12364	13032
Business income	12869	12947	5062	4602
Deductions	236	254	69	126
Gross income	27833	28354	21221	21770
Taxable income	24475	25093	18555	19082
Tax liability	5722	5926	3571	3664
<i>Spouse defined based on 2002-2003</i>				
Number of observations	25316	25316	23993	23481
Wages	11603	11844	12795	13596
Business income	13012	13390	17828	19655
Deductions	243	265	68	130
Gross income	28004	28972	34651	37594
Taxable income	24608	25643	31740	34652
Tax liability	5749	6088	6135	6716

Table 7: Regression of log gross income on flat tax dummy

Specification	Coefficient	t-value	1st stage	t-value	N
<i>One-year differences</i>					
Fixed effect	0.25	33.79			6028146
Business dummy	1.12	25.44	0.074	93.24	4002065
2nd or 3rd bracket	4.21	79.98	0.053	89.86	4002065
High income in 2/3 bracket	3.91	76.29	0.066	84.77	4002065
High income and business	1.18	57.74	0.23	108.05	4002065
<i>Three-year differences</i>					
Business dummy	0.77	35.47	0.190	124.02	1293079
2nd or 3rd bracket	2.72	73.25	0.123	92.16	1293079
High income in 2/3 bracket	2.46	68.11	0.151	86.52	1293079
High income and business	0.75	47.49	0.52	123.44	1293079
Married in 02/03					
<i>One-year differences</i>					
Business dummy	0.65	12.66	0.084	76.06	1497038
2nd or 3rd bracket	2.97	52.26	0.065	100.57	1497038
High income in 2/3 bracket	2.63	49.86	0.082	61.10	1497038
High income and business	0.86	36.22	0.26	78.68	1497038
<i>Three-year differences</i>					
Business dummy	0.58	21.88	0.198	96.12	485430
2nd or 3rd bracket	1.77	40.54	0.11	68.40	485430
High income in 2/3 bracket	1.44	35.93	0.177	61.70	485430
High income and business	0.53	26.79	0.56	93.59	485430
Other specifications, one-year differences					
High income, busines and top brackets only	1.02	9.73	0.07	15.33	50240
Business dummy, splines in income	0.71	15.92	0.07	91.81	4002065

Table 8: Regression of log taxable income on flat tax dummy

Specification	Coefficient	t-value	1st stage	t-value	N
<i>One-year differences</i>					
Fixed effect	0.27	36.19			6012460
Business dummy	0.89	19.82	0.076	92.93	3987287
2nd or 3rd bracket	3.97	77.69	0.053	89.60	3987287
High income in 2/3 bracket	3.64	73.80	0.066	84.51	3987287
High income and business	1.01	48.90	0.23	107.59	3987287
<i>Three-year differences</i>					
Business dummy	0.97	42.96	0.195	123.32	1287574
2nd or 3rd bracket	2.52	69.36	0.122	91.83	1287574
High income in 2/3 bracket	2.22	63.46	0.150	86.17	1287574
High income and business	0.66	40.55	0.525	123.31	1287574
Married in 02/03					
<i>One-year differences</i>					
Business dummy	0.49	9.37	0.086	75.88	1491032
2nd or 3rd bracket	2.80	50.53	0.052	67.47	1491032
High income in 2/3 bracket	2.43	47.78	0.081	60.95	1491032
High income and business	0.74	30.67	0.265	78.44	1491032
<i>Three-year differences</i>					
Business dummy	0.71	25.40	0.20	95.65	483311
2nd or 3rd bracket	1.63	37.50	0.11	68.10	483311
High income in 2/3 bracket	1.26	31.56	0.176	61.38	483311
High income and business	0.47	22.59	0.56	93.45	483311