The effect of the VAT threshold on the behavior of small businesses

Evidence from the Norwegian Value Added Tax

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Thesis for Master of Philosophy in Economics

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The effect of the VAT threshold on the behavior of small businesses: Evidence from the Norwegian Value Added Tax
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Preface

This thesis is written as a part of the Master of Philosophy in Economics at the University of Oslo. I have found the process of writing the paper challenging and interesting. It has contributed a lot to my personal and professional growth by helping me realize my full potential. I would like to thank the Department of Economics for giving me this opportunity and providing me with an excellent study environment to seize it.

First and foremost, I wish to express my gratitude to my supervisor Diderik Lund. His contribution to my work is significant. I appreciate his generous sharing of rich knowledge in the field, enthusiasm, attention and hours of revisions and advice. All remaining mistakes are my own responsibility.

My work has been facilitated by the research center Oslo Fiscal Studies, a cooperation that involves Statistics Norway (Statistisk sentralbyrå) as well as the Department of Economics. I would like to thank Statistics Norway for providing me with high quality data and a working place. Personally, big thanks to Thor Olav Thoresen for the guidance.

I am grateful to my family and friends in my home country Russia for keeping in touch all along the way to this point. I can feel their support even from a long distance. I wish to thank all my friends and fellow students in Norway for understanding and sharing the burden and stress of the study process, and nevertheless giving me the inspiration and motivation to continue.

Oslo, May 2017

Margarita Zolotukhina
Summary

The starting point of the discussion, provided in the present paper, has been the presence of size-dependent tax policy in Norway. In local settings, entrepreneurs with a turnover less than NOK 50,000 in the previous 12 months are not liable for payment of VAT. This special and differential treatment of agents below the threshold, compared with agents above the threshold, may induce behavioral distortions among them. The purpose of my master thesis is an analysis of small businesses in Norway, and an attempt to answer the following questions:

- Do Norwegian firms bunch at the VAT threshold?
- Is this effect different across different groups of agents?
- Why and how do the firms bunch?
- Should the authorities try to prevent such behavior? If so, why and how?

Since VAT continues to be ranked the main consumption tax, due to its revenue capacity and worldwide prevalence, similar questions were asked by international researchers in a number of countries with similar tax regimes. Growing interest in the posed topic from the international community is driven by an evaluation of the efficiency of the VAT system as a growth-friendly form of taxation, and its potential modernization.

Evidence of bunching behavior at the VAT threshold was discovered in Armenia, Ethiopia, Finland and the UK. Guided by existing findings, I use a kink concept as a theoretical framework for analyzing the behavior of small businesses around the VAT threshold, capturing distinctive features of the Norwegian VAT system. Objects of interest, namely entrepreneurs with a turnover of less than NOK 50,000 in the previous 12 months do not have any VAT registration obligations, and are not required to report their turnover to the VAT register. Due to this, obtaining the data is problematic and I explore detailed micro data on agents’ taxable income derived from business activity in the period 2004 – 2013, which reflects before tax sales.

An empirical analysis shows evidence of bunching behavior at the VAT threshold in a pooled sample of Norwegian entrepreneurs. The pattern remains, varying in values, in investigations of groups formed by gender, country of birth and form of business organization.
For quantitative analysis, I use STATA 13.1. I construct a counterfactual distribution of firms in the absence of a VAT threshold, and compare it with the empirical distribution. In my master thesis, the counterfactual distribution is represented by a 7th order polynomial. A lower limit of the bunching region is set visually, while an upper limit of the bunching region is determined by balancing excess mass in firms’ frequency just below the threshold, with missing mass above the threshold. A relative excess mass is considered to be an indicator of bunching behavior. Standard errors for all estimates of interest are constructed using the residual bootstrap technique.

Main sources for explanation of bunching are suggested to be a discontinuous jump in remitted VAT at the threshold and compliance costs. The compliance costs represent a wide field for study and speculations. They are difficult to measure, but in general a burden of disproportionate share of compliance costs relative to income is larger for small businesses than for big enterprises. In addition, compliance costs are closely related to personal characteristics of small firms’ owners as decision makers. Negative effects of bunching behavior of small businesses are notable; revenue loss in absolute monetary terms due to tax non-compliance is accompanied by decreasing efficiency due to growth restriction. Learning the particular mechanism of bunching behavior will help to develop an appropriate corrective policy for such a distortion.
Table of contents

1 Introduction ............................................................................................................................... 1
2 Institutional background: tax system and the VAT threshold in Norway ............................. 6
3 Theoretical framework ............................................................................................................. 11
  3.1 Kink versus notch .............................................................................................................. 11
  3.2 Related literature ................................................................................................................. 14
  3.3 Explanation of bunching at the VAT threshold ................................................................. 16
  3.4 Possible bunching mechanisms ......................................................................................... 21
4 Methodology ........................................................................................................................... 24
5 Data source and sample selection .......................................................................................... 27
6 Empirical results ...................................................................................................................... 31
  6.1 Overall response ............................................................................................................... 31
  6.2 Heterogeneity in response ................................................................................................ 34
    6.2.1 Country of birth .......................................................................................................... 34
    6.2.2 Gender ....................................................................................................................... 36
    6.2.3 Forms of business organization ................................................................................. 38
7 Conclusion ............................................................................................................................... 41

Bibliography ............................................................................................................................... 45

Appendix .................................................................................................................................... 49

A Methods for calculating VAT ................................................................................................. 50
B Comparative information about VAT rates and thresholds in OECD member countries .... 52
C Graphical representation of bunching behavior at the kink, using polynomials of 5th, 6th and 8th order ......................................................................................................................... 55

Figure 1: Norwegian tax-to-GDP ratio over time. ...............................................................2
Figure 2: Norwegian tax structure compared to the OECD average ........................................2
Figure 3: Norwegian VAT revenue years 2000 – 2015 ..........................................................3
Table 1: Norwegian VAT rates years 2004 – 2017 .................................................................7
Table 2: Norwegian VRR values 2005 – 2014 ...............................................................10
Figure 4: Kink theoretical framework .....................................................................................12
Figure 5: Notch theoretical framework ..................................................................................13
Figure 6: Illustration of bunching behavior ..........................................................................24
Table 3: Owner-level descriptive statistics of the final sample ...........................................29
Table 4: Average taxable income on owner- and firm- levels ..............................................30
Figure 7: Bunching at the VAT threshold, years 2004 – 2013, 7th order polynomial ........31
Table 5: Model specifications. .................................................................................................................. 32
Table 6: Variation of bunching region. ....................................................................................................... 32
Figure 8: Bunching at the VAT threshold, responses in subsamples in the context of country of birth. ................................................................................................................................. 34
Table 7: Model specifications, subsamples in the context of country of birth. ........................................ 35
Table 8: Model specifications, subsamples in the context of gender. ......................................................... 37
Figure 9: Bunching at the VAT threshold, responses in subsamples in the context of gender. ............... 37
Table 9: Model specifications, subsamples in the context of forms of business organization. ............... 39
Figure 10: Bunching at the VAT threshold, responses in subsamples in the context of forms of business organization. .................................................................................................................. 40
Table A1: Tax cascading with credit-invoice method VAT. ...................................................................... 50
Table A2: Tax cascading with subtraction method VAT. ......................................................................... 51
Table B1: VAT rates in OECD countries years 2005 – 2016. ................................................................. 52
Table B2: Registration/Collection thresholds in OECD countries 2016. .............................................. 53
Figure C.1: Bunching at the VAT threshold, years 2004 – 2013, 5th order polynomial. ............... 55
Figure C.2: Bunching at the VAT threshold, years 2004 – 2013, 6th order polynomial. ............... 56
Figure C.3: Bunching at the VAT threshold, years 2004 – 2013, 8th order polynomial. ........... 56
1 Introduction

In the last half-century, the Value Added Tax (VAT) has been widely implemented in many parts of the world. This popularity can be explained by the key features of the tax: neutrality and transparency. Tax neutrality is ensured by the mechanism of deduction of input tax through the supply chain, as far as the end consumer. This important feature helps producers to avoid the pressure for preferential nature of the product, number of transactions and structure of the distribution chain. With regards to international trade, VAT demonstrates neutral treatment of export, as VAT taxes exports at a zero rate, or are exempt from VAT with an allowance for input tax deduction. VAT does not affect the competitiveness of domestic firms to export, and is well suited to the demands of a globalizing economy. The transparent nature of VAT provides a simple method of calculation and payment for consumers. It is calculated for them at the point of sale and they make the payment as a part of the purchase price.

Perceived as transaction-based, VAT has a high revenue-raising capacity and provides a large revenue source in almost all countries-members of the Organization for Economic Co-operation and Development (OECD), including Norway. Considering all forms of taxation, OECD Revenue Statistics (2016b) ranks Norway 9th out of 35 OECD countries with 38,1% in terms of the tax-to-GDP ratio in 2015. Figure 1 shows Norwegian tax-to-GDP ratio over the last 15 years.

The values are at least 20% higher than the average among OECD countries. A slight decrease in Norwegian tax-to-GDP ratio in 2007 onwards can be explained by the financial crises, and moves with the same amplitude as other OECD countries. However, the downward trend in Norway between the years 2014 and 2015 is not reflected in other OECD countries. According to Eurostat Statistics Explained (2016), in the same time period, decreases were observed in just seven European Union (EU) Member States (Ireland, Denmark, Belgium, Malta, Luxembourg, Cyprus and Portugal), as well as in Norway and Iceland, while an increase was observed in 20 EU Member States. To find specific reasons for this variation would require a more in-depth analysis, otherwise a relatively consistent metric related to economic activity indicates the absence of major shifts in tax law or serious economic downturns in Norway.

1 In the present paper, comma is used as a decimal mark.
Figure 1: Norwegian tax-to-GDP ratio over time.

Source: OECD (2016b).

But what part in the whole tax revenue does VAT have? In general, three main categories of tax revenue are distinguished: indirect taxes (including VAT), direct taxes (including income and wealth taxes) and net social contributions. This specification can also be implemented for describing the Norwegian tax structure, which is illustrated in Figure 2.

Figure 2: Norwegian tax structure compared to the OECD average.

Source: OECD (2016b).
VAT is the third largest resource and amounts to 20% of the tax revenue. In absolute terms, the VAT revenue constituted MNOK 255,181 in 2015. Compared to the year 2000, it has almost doubled. Figure 3 shows a significant increase in Norwegian VAT revenue in the last 15 years, excluding the period between 2007 and 2009 which is associated with the financial crisis.

Figure 3: Norwegian VAT revenue years 2000 – 2015.


These changes could be attributed to changes in tax legislation, as well as changes in economic activity. The standard rate was increased from 23% in 2000 to 25% in 2017, which does not seem sizable, but reduced rates were first applied in 2001 and have been changed from 12% in 2001 to 15% in 2017 and from 6% in 2004 to 10% in 2017.

From the above data, VAT can be considered to be more favorable to economic growth than other taxes. That is why I find the study of local tax rules and their impact on domestic economic activity very important. In the present thesis, I want to focus on one of the size-dependent regulations implemented to small businesses. In most countries there is a tax scheme to help small businesses, under which firms whose sales of VAT-liable goods and services fall below a certain annual limit may be exempt from VAT. In Norway, a business should be registered with the VAT Register (MVA-registeret) when the total value of sales and withdrawals that fall under the scope of the Norwegian VAT Act exceeds NOK 50,000 during a 12-month period.
Small businesses can be considered as an engine of economic growth by providing employment opportunities to people, investments and innovation to the community. This scheme may have significant impact on the behavior of small businesses. Does it contribute to small businesses and the whole local economy, or restrict the growth?

Recent research in Finland by Harju, Matikka, and Rauhanen (2015, 2016) and in the UK by Liu and Lockwood (2015, 2016) on the VAT threshold gives evidence of firms’ bunching below the VAT threshold. Relatively permanent bunching behavior implies that the threshold decreases the growth and development of small businesses. Taking into account tax system and threshold differences, I was inspired to study the behavior of small businesses at the VAT threshold in Norway.

First, I will find evidence of firms’ bunching around the VAT threshold. Second, I will exploit heterogeneity in firm-level characteristics across small businesses, such as forms of business organization, and owner-level characteristics, such as gender and country of birth. Third, I will discuss reasons and mechanisms of bunching. Do firms restrict their sales, thereby influencing a growth effect in the economy? Or do they under-report sales and implement various tax avoidance schemes? Clearly both approaches are highly undesirable for the domestic economy, as they violate a main goal of raising revenue. For the growth restriction and production inefficiency mechanism, a solution lies in careful evaluation of how VAT is implemented and administered.

The threshold issue is of great practical importance, given that the low initial threshold in several countries has been cited as one of the VAT's key weaknesses. It is considered a prime reason why Ghana's VAT failed when first introduced in 1995 (at a registration level of $20,000, compared with $75,000 on its successful reintroduction in 1999). It is also one of the reasons Uganda's VAT nearly failed when it was introduced in 1996 (at $20,000, later raised to $50,000) (Ebrill, Keen, Bodin, & Summers, 2002, Best practices in design, para.2).

Compliance improvement may be achieved by strengthening audits and penalties for deliberate evasion, as well as assistance for innocent taxpayers who do not understand the
rules. An understanding of the anatomy of the response of small businesses will lead to appropriate suggestions about changes in government regulations.
2 Institutional background: tax system and the VAT threshold in Norway

VAT is an indirect tax on the consumption of goods and services. Compared with single-stage sales taxes, which are levied on the actual value of output at each stage of the productive process, VAT relates to the value added to the goods or services at each individual stage, and amounts to the difference between output tax and input tax.

Output tax is the VAT that is chargeable at the appropriate rate on the sale of taxable commodities by a taxable person. An entrepreneur has to be registered for VAT, and calculate the output tax when his taxable turnover has exceeded the threshold for compulsory VAT registration. Meanwhile the input tax is the VAT added to the price of commodities liable to VAT, which are purchased by the entrepreneur. It can be deducted.

There exist several major types of VAT systems, adopted all over the world. The difference is in the method of calculating VAT, taxable base, rates, thresholds and exemptions. James (2011) mentions three main varieties of VAT: the European model, the New Zealand model and the Japanese model. In the New Zealand model, the VAT is levied at a single rate on a relatively broad base. A European-style VAT is distinguished by the existence of multiple rates, a limited tax basis subject to a consistently high standard rate and a low registration threshold. Both models use the credit-invoice or invoice-based method of calculating VAT, when sales transactions are taxed, with the customer informed of the VAT on the transaction. In contrast, only in the Japanese model is the subtraction method of VAT calculation used. This method is also called “account-based,” as it is based on information from business’s books and records of account. Under this method of VAT calculation, at the end of a reporting period the business calculates the difference between all taxable sales and the sum of all taxable purchases and the VAT rate is applied to the difference. In Appendix A, I have included examples that illustrate the mechanisms of these two methods.

Without focusing on the factors, which have exactly shaped the Norwegian VAT regime, we can say that Norway has adopted a European-style VAT model. The principles and structure of Norwegian VAT are incorporated in the Act of 19 June 2009 no. 58. relating to Value
Added Tax (the VAT Act) or Merverdavgiftsloven (2009). Detailed information about Norwegian VAT rates is presented in Table 1.

Table 1: Norwegian VAT rates years 2004 – 2017.

<table>
<thead>
<tr>
<th>Year</th>
<th>Threshold (nok)</th>
<th>Standard rate (%)</th>
<th>Reduced rates</th>
<th>Fish supply (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Food and beverages (%)</td>
<td>Passenger transport, accommodation, cinema tickets, cultural and sports events (%)</td>
</tr>
<tr>
<td>2016-2017</td>
<td>50000</td>
<td>25</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>2012-2015</td>
<td>50000</td>
<td>25</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>2007-2011</td>
<td>50000</td>
<td>25</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>2006</td>
<td>50000</td>
<td>25</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>50000</td>
<td>25</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>2004</td>
<td>50000</td>
<td>24</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>


The standard VAT rate is 25%. This is one of the highest values among OECD countries, on a par with other Scandinavian countries as Sweden, Denmark, Iceland. This is in accordance with a common knowledge about high taxes in the region, and was discussed in an example of income tax in a paper by Kleven (2014). Comparative information about VAT rates in OECD countries, according to the OECD report “Consumption Tax Trends 2016”, is presented in Appendix Table B1. The Norwegian tax system also includes several reduced VAT rates: food and beverages are taxed at 15%, fish supply at 11,11%, and the VAT rate for passenger transport, accommodation (hotel, letting of rooms and cabins, etc.), cinema tickets and certain other services is 10%. As we see in the table, the standard rate has not changed in the last 10 years, and most variations in tax legislation happened by increasing the reduced rates. With regard to the VAT Act, some supplies are zero-rated. This means that output VAT will not be calculated as the rate is zero, but input VAT can still be deductible. Reduced zero tax rates reflect a tax on goods and services that form a larger share of expenditures of the poorest households, that helps to offset the regressive nature of a VAT. Wide implementation of reduced tax rates sufficiently narrows down a tax base subject to the high standard rate. Some services, like health, social and educational services, are exempt from VAT, which means that such supplies fall entirely outside the scope of the VAT Act without a credit for input tax. Exemptions are generally used because of the difficulty in determining the nature of services provided and computing value added.
The balance between input and output tax is one of the primary considerations when a business is deciding whether to become VAT registered. All businesses in Norway that have a taxable turnover in excess of NOK 50,000 during a 12-month period (note: a calendar year is not necessarily used) have an obligation to register as subject to VAT. For charitable and public utility institutions and organizations, the threshold is set at NOK 140,000. The term “taxable turnover” also includes an entrepreneur’s withdrawal of commodities for private use from a registered business. This refers to a backward-looking rule governing registration. A forward-looking rule, or an advanced registration, is also possible in Norway. The firm must register for payments of VAT if its turnover is expected to exceed the threshold in three weeks from a start of sales, or have notable purchases to the amount of NOK 250,000, which are directly related to following sales subject to VAT.

Entrepreneurs whose turnover from taxable activities does not exceed the thresholds may register for VAT voluntarily. The VAT threshold in Norway is equivalent to USD 5,102, according to the OECD report “Consumption Tax Trends 2016”, Annex C, exchange rate for conversion into USD is Purchasing Power Parity rates (PPPs) for GDP in 2015, and equals 9.8. The threshold is the lowest value among OECD countries. Information about implementation of thresholds in OECD member countries is presented in Appendix Table B2.

Before making a decision about registration for payment of VAT, entrepreneurs should take into account deregistration rules envisaged in Norway. Deregistration is free of charge, but should be notified using the Coordinated Register Notification form. As input VAT was deductible during the business activity, output VAT should be calculated on all remaining goods or assets treated as withdrawals after submitting notification. Importantly, even if turnover from taxable activities of entity falls under the VAT threshold without the business being deleted, the entity remains registered in the VAT register for two consecutive calendar years.

In this section, I would briefly mention the VAT reporting process in Norway. The details fall under the scope of accounting, but general information is directly related to firms’ compliance costs, which I will discuss in section 3.3. All the firms registered in the VAT register must calculate and report VAT to Norwegian tax authorities. This shows how much VAT has been collected on behalf of the state and how much tax the company has paid. Typically, the process includes preparation activities, filing activities and payment activities. The process is
highly automatized and comes down to sending required forms electronically through Altinn services in certain terms. Technology makes the process easier, which in turn reduces compliance costs. The deadline for payment is fixed as one month and 10 days after the expiration. There are six maturity dates per year, and the rule is universal for everyone, except entrepreneurs with a turnover under one million kroner in a calendar year. They may apply to submit a tax report once a year, thereby reducing a compliance tax burden.

In Norway, along with 93 other countries, the VAT refund is available. This so called “post-filing process” includes claiming a VAT refund, the waiting time to obtain it and any complaints. A report by PricewaterhouseCoopers (PwC) and the World Bank Group (2017) informs that the time to comply with a VAT refund in Norway amounts to 9 hours, which is higher than the average value among EU countries and members of the European Free Trade Association (EFTA), namely 7,1 hours, but stays within the limits of worldwide indicators, 14,2 hours. This variation can be explained by the different amount of information required to be reported by firms for VAT refunding. The waiting time to obtain a VAT refund in Norway is 10 weeks, which is less than the average time among EU and EFTA countries, 14,8 weeks.

I should mention administrative sanctions and penalties, which are designed within VAT legislation in Norway. “The Worldwide VAT, GST and Sales Tax Guide in 2017” by Ernst & Young (EY) (2017) summarizes:

Any entity that willfully or negligently fails to register for VAT could be subject to fines or imprisonment. Penalties and interest will also be assessed if, as a result of late registration, a taxable person submits a late VAT return or pays VAT late[...] The interest rate is announced twice a year in a decree issued by the Ministry of Finance. The annual interest rate as of 1 July 2016 was 8,5%. The minimum penalty is NOK100. An additional penalty of up to 100% of the tax due for a period may be imposed on taxable persons that willfully or negligently contravene the provisions of the VAT Act. (p. 761, 766).

\footnote{Altinn is an internet portal of Norwegian authorities for electronic communication with firms and citizens.}
To evaluate efficiency of a VAT system, or performance of VAT, Keen (2013) suggests to use an indicator “C-efficiency”. As VAT is mostly a revenue-raising instrument, the c-efficiency reflects the difference between the actual VAT revenue and the potential one, which is calculated by applying a standard rate to the final consumption expenditures. C-efficiency is 100% if a uniform tax rate would be applied to all goods and services in the economy, a so called “pure” regime. This measurement is widely used by the International Monetary Fund (IMF) and underlies estimates of a VAT Revenue Ratio (VRR) for OECD countries, where the difference is in determination of potential tax. OECD report “Consumption Tax Trends 2016” provides us with the latest available values of VRR for Norway, which are presented in Table 2.

Table 2: Norwegian VRR values 2005 – 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRR</td>
<td>0.57</td>
<td>0.61</td>
<td>0.63</td>
<td>0.57</td>
<td>0.54</td>
<td>0.56</td>
<td>0.56</td>
<td>0.57</td>
<td>0.57</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Source: OECD (2016a), Table 3.A3.1.

The Norwegian VRR has consistently been above the average for OECD countries, but still indicates a hidden potential of raising revenue, when compared to New Zealand’s 0.97. In general, Norway is characterized by a unified and stable-over-time legislative tax regime, with easy public disclosure of individual taxpayer information. This can be considered as a positive factor, as it decreases additional compliance costs due to adaptation of firms to newly implemented rules. A VRR value less than 1 reflects policy compliance gaps. A policy gap is caused by a variety of tax rates and exemptions, which is notable in reducing the revenue. They may be considered a negative factor, leading to fraud when products are misclassified. Implementation of a low threshold does not exclude a significant amount of small businesses, what in turn increases compliance costs for agents and administrative costs is linked to tax collection for the government. These factors, working mostly in combination rather than in isolation, increase complexity and negatively affect the efficiency of the whole tax system.
3 Theoretical framework

Obviously, a bunching approach is widely applied across fields beyond the context of VAT taxation. In this section, I will review literature related to the topic. Based on a paper “Bunching” by Kleven (2016) which provides a guide to bunching estimation and the theory that underlies it, I will highlight two fundamental design concepts for analyzing bunching behavior: kink and notch. Focusing on papers by Harju et al. (2015, 2016) and Liu and Lockwood (2015, 2016), I will use a kink conceptual framework for an investigation of bunching reasons and mechanisms in a Norwegian setting, related to the VAT threshold.

3.1 Kink versus notch

As mentioned above, the bunching approach has found plenty of applications, including education studies, social insurance, labor regulation and fuel economy policy. But originally it was developed in the context of income taxation, and was used to estimate behavioral labor responses to taxes and transfers for further estimation of structural parameters, such as (compensated) elasticities and prediction of policy changes.

Two main methods of studying the different types of discontinuity in responses that are found in different tax systems were developed. One is based on kink points (Seaz (2010) and Chetty, Friedman, Olsen, and Pistaferri (2011)) and the other is based on notch points (Kleven and Waseem (2013)). To provide a short explanation of baseline theoretical frameworks, I consider an example of earnings responses to taxes.

Kinks refer to discrete changes in a slope of choices set. Let us consider a convex kink, namely an increase in the marginal tax rate from $t$ to $t + \Delta t$ at the earnings threshold $z^*$. Figure 4a illustrates effects of bunching in a budget set diagram of earnings $z$ and consumption $z - T(z)$, referring to after-tax income. Let us focus on two types of individuals: type $n^*$ and $n^* + \Delta n^*$, where $n$ determines ability. Before the kink introduction, all individuals are located along a linear budget line with a slope $(1 - t)$. Depending on their ability, type $n^*$ workers choose the level of earnings equals $z^*$. Their indifference curves render utility $u\left(z - T(z), \frac{z}{n}\right)$, where $T(z) = t \cdot z$ is a linear tax function, and have a tangent with the budget line exactly at $z^*$. Type $n^* + \Delta n^*$ workers have earnings level up to $z^* + \Delta z^*$ and a tangent to the upper part of the budget line, after the point $z^*$.
After introduction of the kink, the tax function becomes \( T(z) = t \cdot z + \Delta t \cdot (z - z^*) \cdot I(z > z^*) \), where \( I(\cdot) \) is an indicator function. Notice, that the kink does not change the tax rate on units below \( z^* \). The slope of the budget line changes to \( (1 - t - \Delta t) \) after the point \( z^* \). Taking to account prekink optimal choices, no changes in the behavior of type \( n^* \) workers are expected. In contrast, the second group of individuals of type \( n^* + \Delta n^* \) reveal bunching behavior. With the kink introduction they tend to shift to a lower indifference curve with the tangent at the kink point. A representative individual with \( z^* + \Delta z^* \) earnings is a marginal
buncher, the last that is willing to bunch. All other workers with earnings above \( z^* + \Delta z^* \) do not change their behavior in a similar way.

As shown in Figure 4b, the density distribution diagram, this behavior produces an excess of bunching in the earnings distribution at the kink point. There is a downwards shift in a post-kink distribution of earnings after the level \( z^* \), but not a hole. Individuals above the marginal buncher reduce their earnings in response to a higher marginal tax rate and fill up the hole. Furthermore, the measured excess bunching is used to determine response by the marginal buncher \( \Delta z^* \), that is used for deriving an earnings elasticity.

Now let us look at the notches theoretical framework. Notches indicate discrete changes in the level of choice set. In the same setting, consider an increase in the average tax rate from \( t \) to \( t + \Delta t \) at the earnings threshold \( z^* \). Similarly, Figure 5a illustrates effects of bunching in a budget set diagram of earnings \( z \) and consumption. Now the marginal buncher is indifferent between a post-notch allocation exactly at point \( z^* \) or at the best interior point \( z' \).

Figure 5: Notch theoretical framework.
In Figure 5b, a density distribution diagram is shown. It is possible to observe the hole in distributions of earnings above the threshold. Nobody is willing to stay in the \((z^*, z')\) region. Those individuals, who originally were located above the marginal buncher, adjust their earnings in response to the tax rate change, but still do not cross the \(z'\) point. A distinctive feature of the notch approach is the presence of a region of strictly dominated choice \((z^*, z^* + \Delta z^D)\) that determines the lower bound for the bunching region \((z^*, z^* + \Delta z^*)\). In region \(\Delta z^D\) “it is possible to increase both consumption and leisure by moving down to the notch point \(z^*\), making such earnings choices dominated under any parametric form for preferences” (Kleven, 2016, p. 442).

### 3.2 Related literature

Due to significant differences in the VAT regimes implemented in different countries, investigation of the bunching behavior at the VAT threshold still remains quite a narrow topic. While working on my master thesis I have investigated several theoretical and empirical studies to discuss this problem. I revealed the absence of any international comparisons; most of the papers are written in connection to the specific local tax settings of a single country.

As pointed out by Onji (2008, p.1), “despite the pervasiveness of policy thresholds, to this author's knowledge, the distortions are discussed in press but not well documented in the
academic literature”. The paper presents evidence of a behavioral response from the restructure and splitting of big Japanese corporations, due to the introduction of a threshold in VAT legislation. It is beneficial to become familiar with this work as one of the earliest discussed distortions in firms’ behavior and efficiency loss, induced by a size-dependent public policy.

Liu and Lockwood (2015, p. 3) “develop a conceptual framework for studying the two key aspects of behavioral response to VAT including voluntary registration and bunching” for all of the firms in the UK. Besides showing clear evidence of bunching below the VAT threshold, it is interesting to note that, “bunching is more likely when (i) the cost of inputs relative to sales is low, or (ii) when the proportion of B2C sales is high” (ibid, p.3). In the present thesis I will not check this empirically, but will exploit the ideas later in section 3.3 for an explanation of bunching behavior in Norway. At first sight, the intuition behind the studies in the UK seem applicable to Norwegian realities due to similarities in local tax settings: implementation of a European-style VAT with a high standard rate of 20% subject to a limited tax base (reduced rates 0% and 5%); a credit – invoice method VAT calculation and the existence of a registration threshold. However, the UK sets the highest threshold among OECD countries of USD 118,841. In contrast, Norway has the lowest limit, equal to USD 5102. This significant difference may play an important role in the reasons and mechanisms of an overall behavioral response to the size-dependent policy. For example, the low VAT threshold pins down heterogeneity in analyzed firms. Firms below the threshold are mostly managed by a single owner. In this case, I assume that the decision to bunch depends on owner-level characteristics to a higher degree than in UK settings. If we consider that compliance costs explain a lot in bunching behavior, it is not so costly for bigger companies under the threshold in the UK to comply. Moreover the mechanism of bunching by permanent tax avoidance, in terms of restructuring or splitting larger firms into smaller ones is unlikely, as the representatives are already the smallest entities in the Norwegian firm universe.

The latest research from Asatryan and Peichl (2016) consider the problem of behavioral responses of small firms to different tax policy incentives in a developing country. Among others, they study a tax notch created by the VAT threshold in Armenia. The tax system in Armenia has undergone experiments, and is characterized by weak tax administration, a broad tax base, a high VAT threshold of USD 140,000 and a high level of tax non-compliance. The authors mention an interesting trade-off between setting a higher threshold for firms, as they
have high compliance costs, and lost tax revenues, which is a problem for a developing country that heavily relies on it. They are unable to find significant bunching at the VAT threshold in Armenia. For this controversial result “A plausible interpretation is that the VAT registration threshold in Armenia is set sufficiently high so that the compliance costs of firms of this size, on average, do not outweigh their benefits from registering as VAT payers.” (Asatryan & Peichl, 2016, p. 4).

The researches, mentioned above, investigated the setting of a high VAT threshold, and use a notch design for their research, while the Norwegian VAT system can be considered as a kink (recall section 3.1). Due to this, I extend this literature review with the most recent Finnish studies by Harju et al. (2016). In addition to the above-mentioned similar economic climate, the VAT threshold in Finland amounts to USD 10,753, which is closer to the Norwegian indicator. After 2004, the VAT notch in Finland at the threshold was replaced by the VAT kink, implying a gradually increasing remitted VAT from sales only above the threshold. It is interesting to point out that “the VAT relief scheme was applied to firms with annual sales below 20,000 euros in 2004” (Harju et al., 2016, p. 9). Norway does not have relief schemes, which are widely considered to increase compliance costs and be one of the reasons for bunching, “Simplifying and clarifying the procedure for applying for the relief in 2010 could thus also contribute to the decrease in observed bunching after the reform.” (ibid, p. 30).

Analogous studies were conducted for Ethiopia by Gebresilasse and Sow (2015) and for South Africa by Boonzaaier, Harju, Matikka, and Pirttilä (2016). These papers represent modern investigations, showing a growing interest in the discussed topic, based on fundamental works, which I mentioned above. The obtained results are consistent with theoretical suggestions and, as I said, explained largely by unique local tax settings in the country under study. In order to capture distinctive features of the Norwegian VAT system, my work of exploring the effect of the VAT threshold on the behavior of small businesses in Norway will contribute to already existing world wide practices.

### 3.3 Explanation of bunching at the VAT threshold

For my investigation, I find it appropriate to use a theoretical framework for an explanation of bunching behavior, presented in the paper Harju et al. (2015). Two main sources of bunching behavior are discussed: a discontinuous jump in remitted VAT at the threshold and
compliance costs. In the report “Paying Taxes 2017” by PwC and the World Bank Group, it is pointed out that how easy companies pay taxes is not only determined by the amount of taxes, but also by compliance and administrative requirements which firms must obey to pay the tax.

Algebraically, assume that firms below the threshold face profit maximization problem:

$$\pi = (s - d(s))(1 - \tau_p) - c(s),$$ (1)

And firms above the threshold face following maximization problem:

$$\pi = \left((s - d(s))(1 - \tau_{vat}) + \tau_{vat} \cdot s^*\right)(1 - \tau_p) - c(s) - \delta(s),$$ (2)

where $s$ – twelve month sales of the firm, including VAT,

$d(s)$ – tax-deductible costs, needed to generate $s$ (convex function), including VAT,

$\tau_p$ – an income tax rate,

$\tau_{vat}$ – a VAT tax rate,

$c(s)$ – non-deductible costs (convex function),

$\delta(s)$ – compliance costs, related to VAT reporting.

Consider a small interval below the threshold $[s^* - \epsilon, s^*]$, firms not registered for VAT do not pay output VAT and are not able to deduct input tax, the differentiation of profit function with respect to $s$ takes form $(1 - d'(s))(1 - \tau_p) - c'(s)$.

At $s^*$, the firm must be registered for VAT and pay output tax on sales exceeding the threshold, pay compliance costs and may deduct input tax on all deductible costs, needed to generate $s$. The profit function can be rewritten in the following form:

$$\pi = (s - d(s) - \tau_{vat} \cdot (s - s^*) + \tau_{vat} \cdot d(s))(1 - \tau_p) - c(s) - \delta(s),$$ (3)

and its differentiation with respect to $s$ yields $(1 - d'(s) - T'_{vat}(s) + \tau_{vat} \cdot d'(s))(1 - \tau_p) - c'(s) - \delta'(s)$.
Bunching occurs when the firm observes its profit is an increasing function of $s$ everywhere below $s^*$, but a decreasing function of $s$ everywhere above $s^*$. Namely, I need:

$$
(1 - d'(s))(1 - \tau_p) - c'(s) > 0, 
\tag{4}
$$

$$
(1 - d'(s) - T'_vat(s) + \tau_vat \cdot d'(s))(1 - \tau_p) - c'(s) - \delta'(s) < 0. 
\tag{5}
$$

This means, that the firm’s profits are maximized at $s^*$, but it is not necessary that a first order condition $\tau_vat \cdot d'(s) = T'_vat(s) + \frac{\delta r(s)}{1 - \tau_p}$ is satisfied at $s^*$. The profit is not differentiable in $s$ at the point $s^*$. Taking together inequalities (4) and (5) at the kink point:

$$
\tau_vat \cdot d'(s^*) < T'_vat(s^*) + \frac{\delta'(s^*)}{(1 - \tau_p)},
\tag{6}
$$

Where the first derivative is a right-hand limit, as the VAT function is defined above the kink point.

Tax functions are the same for each firm below the kink point, and also for each firm above. I would pay more attention to an individual firm’s structure of compliance costs and deductible costs, more precisely to the VAT charged on deductible costs, input VAT. This may explain the difference between firms and their distribution along $s$, why some firms end up at the kink point, some – not.

Harju et al. (2016) claim that “Our results strongly indicate that compliance costs are the key factor in explaining the observed behavior” (2016, p. 3). Compliance costs are costs considered to be direct costs, which include all costs incurred by a firm in order to fulfill state or industry requirements. We can classify them according to the stage of their origin: costs associated with invoicing and record keeping, lodgment and post-filing costs, and costs related to claiming and waiting for a VAT refund. They do not include the cost of the tax itself. Typically, an increase in industry regulations leads to higher compliance costs.

Examining key factors of the economic environment in Norway, I can conclude that all companies of interest in this thesis face the same external regulations:

- registration threshold;
- invoicing and record keeping requirements;
• lodgment requirements;
• post-filing requirements;
• availability of helpful guidance from the tax authority.

Obviously, external regulations do not solely determine the value of compliance costs. Predetermined differences in levels of financial, human, social and technological capitals of firms also influence compliance costs. Compliance costs are difficult to measure. They can be expressed as monetary costs, which “refer to the value of resources expended by businesses and individuals to satisfy the requirements of government taxation and regulation” (Evans & Tran-Nam, 2014, p. 7) and psychological costs, which “refer to the stress and anxieties experienced by business owners and individuals in having to satisfactorily deal with taxation and other regulations” (ibid, p. 8). Evans and Tran-Nam (2014) mention the usage of opportunity cost concept for monetary costs estimation. It counts for explicit costs, involving monetary payments (for example, hiring additional employees, as well as additional business process automation), and implicit costs as time losses. In the paper, a high relevance of psychological costs to the size of the business, namely small businesses, is pointed out: “these costs are particularly relevant to small businesses, especially sole traders and partners, since these businesses have rather limited opportunities or capacities to outsource the compliance obligations to third parties such as tax advisers or experts” (ibid). The researchers also mention the effect of some personal characteristics of owners, for example, age. Aged people may feel more stress about the compliance process.

An interesting aspect of the behavior of small businesses under the VAT threshold is voluntary registration. In fact, this is the opposite reaction to bunching behavior on the imposed VAT threshold. It may be beneficial to investigate reasons for voluntary registration as the reverse to bunching behavior. In Norway, there are a number of units with a turnover less than NOK 50,000, which are registered for payment of VAT. With apparent responsibilities for reporting VAT as other liable to VAT firms with a larger turnover, they also got an opportunity to claim a refund. If the difference between output and input tax is negative, firms can claim a VAT refund. So the key for voluntary registration is a variation in the VAT repayment position. Reasons for this occurrence can vary, but one example is a start up with a one-off large capital investment, or a business involving export transactions. In cases of zero-rated, the seller is more likely to be entitled to a VAT refund.
One particular reason for differences in the VAT repayment position has been discussed by Liu and Lockwood (2015, p.3): “voluntary registration is more likely when either (i) the cost of inputs relative to sales is high, or (ii) when the proportion of B2C sales is low ”. This paper sets the linkage between voluntary registrations and bunching behavior, as the authors found evidence of a reverse tendency for bunching, recall section 3.2. “Business-to-business sales” imply transactions between businesses, contrasting to an end consumer. As VAT needs to be charged, a firm increases its price. If a firm registered for VAT payment trades with another firm registered for VAT payment, that does not matter a lot, as the second one can subtract input VAT. But if the buyer is a firm unregistered for payment of VAT, or is the end consumer, they have to give money from their own pocket, thereby increasing their costs. That is a downside, which may lead to customer attrition.

In addition, Liu and Lockwood (2016) have studied whether voluntary registration is really an optimal choice for profit maximization or inertial motion of firms, once having been above the VAT threshold. They assume the existence of “costs of deregistration”, which may constitute the main reason for staying registered. The UK’s tax setting and rules for deregistration were investigated by researchers which computed probabilities of being registered or not registered for t years conditional on initial registration status. They showed “that while there is a considerable amount of persistence in firm behavior, the registration decision is not entirely driven by inertia due to fixed cost of deregistration” (Liu & Lockwood, 2016, p.30). I am highlighting this framework as an additional source for explanation of bunching behavior in Norway. Recall section 2, in the worst scenario for an agent, being productive once and crossing the threshold with subsequent VAT registration that may result in charging VAT on sales for two years, despite having taxable turnover already below the threshold. This can be considered as “costs of deregistration”, which make agents reevaluate their decision on VAT registration and keep their initial status of not being registered, namely strengthen incentives to bunch. Weak evidence for this theory in the UK can be explained by the difference in deregistration rules between the countries. The UK economic environment requires canceling VAT registration within 30 days, since the firm is no longer eligible to be VAT registered. After confirmation of deregistration by tax authorities, which takes around 30 days, the agent must stop charging VAT. The agent can ask tax authorities to cancel registration if his VAT taxable turnover falls below the deregistration threshold of £83 000 (which is lower than the registration threshold of
Therefore firms in the UK do not experience such “costs of deregistration”, and their choice of registration status is mainly driven by optimizing behavior.

### 3.4 Possible bunching mechanisms

The performance of small businesses is an important factor driving economic growth, due mainly because of their innovation and job creating roles. Bunching at the threshold is a behavioral response of agents to an implemented policy, and leads to losses in total output. It threatens tax revenue and affects economic efficiency and trade statistics.

Economic efficiency is determined not only by a firms’ internal capacity, but by the externally implemented policies and environment in which the firms operate. “VAT is ‘self-enforcing’ in the sense that each trader has an incentive to ensure that its suppliers have themselves properly paid VAT, in order that they themselves can claim an appropriate credit” (Keen & Smith, 2007, p.6). By this structure, VAT enables agents to choose inputs for production freely, unless they can claim VAT return. By restricting real business activity and staying under the threshold, firms are not able to follow this logic anymore, which in turn distorts their production decisions and resource allocation. To confirm this theory, and find evidence of firms’ size and output adjustments, Harju et al. (2016) have inspected levels of equity, expenses and wages around the VAT threshold. The smooth distribution of factors points to bunching by reducing real economic activity.

Another widespread bunching mechanism is tax non-compliance. It is undesirable for any tax system activity, when potential taxpayers do not pay tax, including both tax avoidance and tax evasion. Tax avoidance is, roughly speaking, an attempt to reduce the amount of tax payment by means within the law, while tax evasion includes a fraudulent intent and is illegal. It should be emphasized that administrative costs of the tax system increase due to the need to determine whether or not taxpayers have acted within the law. A classical example of tax avoidance is to register another entity by the same owner, instead of developing, increasing sales and crossing the threshold by an already existing unit. Evidence for this theory is provided by Onji (2008), with an example of structural changes in Japanese firms’ universe.

In general, tax evasion is extremely difficult to detect. Usually, statistics and indicators of tax evasion are built on the macro level, focusing on larger enterprises and international VAT carousel fraud schemes. In particular, the academic literature neglects research of tax evasion
on small businesses, despite the fact that they amount to a considerable part of the domestic economy, and have own intentions and opportunities to cheat. Keen and Smith (2007) list the most common types of fraud under VAT, such as under-reporting sales, misclassification of commodities or omission of self-deliveries. Hopland and Ullmann (2017) have studied misclassification of meal consumption type as a VAT evasion scheme among small businesses in the German restaurant industry. In the paper, they point out that this particular strategy is common for small businesses in countries with several tax rates, where on-site sales are taxed at a standard rate, while take-away sales are taxed at a reduced rate. Owners of restaurants have incentives to misclassify the type of consumption, and shift the tax base due to the different VAT rates.

Morse, Karlinsky, and Bankman (2009) discuss the relationship between tax evasion and a source of business income. A large share of small businesses deals with cash payments, which can be easily underreported. Researchers claim that “in the aggregate, owners of small businesses with substantial cash revenue fail to pay about half their taxes” (Morse et al., p. 43). The self-interest of firms may contribute to reducing some forms of tax evasion. In practice, parties have intentions to create legal relations to avoid the risk of unfair treatment. For example, a firm’s services will not be paid in full, or a customer will face unfinished work. If a firm suggests working without a contract, it may seem suspicious to a number of customers and lead to a loss of clients. In contrast, in several cases firms with a turnover below the VAT threshold have registered for payments of VAT voluntarily only for the purposes of looking more stable and presentable. In Norway, the incentives to work with a contract are increasing, due to the possibility of being covered by the Social Insurance Scheme, which is crucial for several market segments, for example, construction work. Involving another party in information exchange is so called “third-party reporting” versus “self-reporting” to the government. Kleven, Knudsen, Kreiner, Pedersen, and Saez (2011) conducted an experiment in collaboration with the Danish tax collection agency, where taxpayers were randomly assigned to different audit regimes. They detected evidence of higher values of tax evasion for self-reporting than for third-party reporting, with an especially interesting conclusion that “the evasion rate for self-employment income conditional on third-party reporting is only 0.33%, suggesting that overall tax evasion among the self-employed is large because of the information environment and not because of, for example, different preferences among those choosing self-employment” (p. 670).
Liu and Lockwood (2016, p.4) “provide some suggestive evidence that part of bunching is driven by evasion, in the form of under-reporting of sales”. An estimated share of the shadow economy in Norway amounts to 13.1% of the GDP in 2014, according to calculations of Schneider, Raczkowski, and Mróz (2015). On the whole, the Norwegian tax system is characterized by a high level of visibility of information, transparency and the ability to be accountable. “Norway has a long history of public disclosure of information from income tax returns, going back at least to the middle of the nineteenth century” (Bø, Slemrod & Thoresen, 2014, p.4). Several studies have stressed the unique historical and cultural background, making a non-confidential communication and openness in public administration possible and traditional in Norway. Due to these features I would doubt misreporting of sales to be the main explanation of bunching behavior in Norway. A more certain conclusion can only be made after additional investigation of the distribution of a firms’ production factors, such as equity, expenses and wages.
4 Methodology

To find evidence of the bunching behavior at the VAT threshold in Norway, and quantify it afterwards, I will introduce a fundamental methodology for analyzing bunching behavior, developed by Chetty et al. (2011) and Kleven and Waseem (2013).

In order to estimate bunching behavior, I need to examine discontinuity of a real sales distribution, comparing it to the counterfactual one. The real sales distribution is observed from the data; it describes the stochastic assignment of firms to a particular bin of chosen width, conditional on the firms’ characteristic - sales level and existence of the VAT threshold. The counterfactual distribution is an assumption, which is widely used in policy analysis in economics. Presently, it is defined as an underlying smooth distribution function reflecting numerous factors that influence the creation, growth and closedown of firms in absence of the VAT threshold.

If there had not been a threshold in the VAT, the actual distribution, observed with some bin size, would have random deviation from the smooth underlying distribution. Otherwise, in the case of bunching, the actual distribution will reveal an increase in the number of firms with sales below the threshold $s^*$ and a decline in firms with sales above the threshold. Graphically this is shown in Figure 6.

Figure 6: Illustration of bunching behavior.
In the figure, the red dashed line represents the counterfactual distributions of sales in the absence of the threshold. The black line represents the empirical distribution of sales. A level of sales is a variable of choice which is under control of entrepreneurs. Due to uncertainty or the inability to immediately adjust supply, this control is not determined as complete or exact control and the empirical distribution does not have a single spike, but has a bunching range near the threshold \( s^* \). It captures a behavioral response in the population. Firms with sales level \( s^* + \Delta \), let’s denote it \( s_H \), indicates the last firm willing to bunch, then \( s_H \) is an upper bound of bunching region near the threshold \( s^* \). \( s_L \) is a lower bound. The range includes only the area affected by bunching behavior by creating excess and missing masses around the threshold \( s^* \).

There are numerous ways to determine this range. I follow the approach developed by Kleven and Waseem (2013), who relied on graphical evidence from the data and determine \( s_L \) visually. It lets me easily measure the excess mass below the threshold (\( \hat{B} \)). Due to the missing mass above the threshold (\( \hat{M} \)) not being so sharp, the \( s_H \) can not be determined visually, but iteratively instead. I will gradually increase \( s_H \) towards the threshold and re-estimate the counterfactual distribution until I equalize the masses \( \hat{B} \approx \hat{M} \). This approach allows the bunching region to be asymmetric.

The counterfactual distribution is not observable. It is built according to Chetty et al. (2011). Due to the constant value of the threshold and low inflation (max 2.78% in 2007) during the whole analyzed period, I do not need to re-center the sales relative to the threshold. I begin by grouping individuals by sales into bins of width NOK \( \delta \). I draw the counterfactual distribution by fitting values from local polynomial regression, excluding observations within the region \([s_L, s_H]\):

\[
    z_j = \sum_{i=0}^{p} \beta_i \cdot (s_j)^i + \sum_{i=s_L}^{s_H} \gamma_i \cdot I(s_j = i) + \varepsilon_j
\]

(7)

where , \( j \) – an index for bin, \( j = 1, \ldots, J \),

\( z_j \) – number of firms in the bin \( j \), frequency,

\( s_j \) – a sales level of the bin \( j \).
p – a polynomial order,
I – an indicator variable equals to 1, when sales \( s_j \) fall into the excluded region,
\( \varepsilon_j \) – an error term of the regression.

Then, the excess mass below the threshold can be measured by following formula:

\[
\hat{B} = \sum_{j=s_L}^{s^*} (z_j - \hat{z}_j)
\]  

(8)

In equation (8), \( \hat{z}_j = \sum_{i=0}^{p} \beta_i \cdot (s_j)^i \) are predicted values from equation (7).

The missing mass above the threshold can be measured by the following formula:

\[
\hat{M} = \sum_{j>s^*}^{s_H} (\hat{z}_j - z_j)
\]  

(9)

and the relative excess mass, which I am interested in, can be computed by :

\[
\hat{b}(s^*) = \frac{\sum_{i=s_L}^{s^*} (z_j - \hat{z}_j)}{\sum_{i=s_L}^{s^*} \hat{z}_j / N_j}
\]  

(10)

where \( N_j \) is a number of bins within the region the region \([s_L, s^*]\).

Following Chetty et al. (2011), I use the residual bootstrap method to obtain the standard errors for all estimates. In this case, the predicted value from equation (7) for each observation is adjusted with a residual that is randomly sampled in the residual set with replacement. This adjusted variable is then used as the dependent variable in the new bootstrap sample. I form 199 pseudo-samples of sales distribution, re-estimate counterfactual distribution and obtain new estimates of interest. Then the standard deviation of the estimates of interest can be evaluated as their standard error.
Data source and sample selection

Due to the low VAT threshold, objects of interest in this paper are firms with a turnover of less than NOK 50,000. These firms do not have obligations of VAT registration or reporting their turnover to the VAT register. Of course, if they are willing to bunch, they would avoid voluntary registration as well. So in my investigation, I find the VAT Register not to be informative. I strongly assume that objects of interest are small firms managed by a single owner. I focus on micro data on sources of entrepreneurs’ income, especially earned income derived from active participation in a trade or business. This reflects before tax sales. This will be termed taxable income in the following chapters. For a picture of income distribution around the threshold, I include in the specification entrepreneurs with a taxable income up to NOK 100,000. Thus, data includes observations of entrepreneurs, who are also registered in the VAT Register.

Statistics Norway (Statistisk sentralbyrå) has provided me with detailed income data. The original data set presents pooled data, including information about individual characteristics for different entrepreneurs for the years 1997-2013 and consists of 52,161,574 observations.

According to the VAT handbook or Merverdiavgiftshåndboken (Skatteetaten, 2016), two reduced rates (excluding a rate on fish supply) were first applied in 2004. Thus in my investigation I focus on the years 2004-2013, when the tax schedule was the most similar to the currently implemented one. This contributes to obtaining actual results for analysis.

A possible overestimation of a relative excess mass can arise due to counting the same entrepreneur several times if his taxable income moves relative to the threshold, and can even cross over it over time. To prevent this, I keep just one observation per individual (with the observation chosen randomly) by using the national identity number (fødselsnummer) of the owner as a unique parameter. A structure of the original data set, namely the way of presentation of taxable income, requires controlling that each entrepreneur owns only one firm. This is easily achieved with such forms of business organizations as a private company limited by shares (aksjeselskap (AS)) and sole proprietorship (enkeltpersonforetak (ENK)). However, it has not been possible to provide definite taxable income for firms with such forms of business organization as general partnership with apportioned liability (selskap med delt ansvar (DA)) and general partnership (ansvarlig selskap (ANS)). Other forms of business
organizations are not presented in the sample. By preliminary assessment, the latter two groups amount to around 6% of the whole sample, so only AS and ENK representatives are chosen for detailed study. All data set modifications in STATA 13.1 result in creating unique links between an entrepreneur with taxable income up to NOK 100 000 and the organization number. That allows me to merge the dataset with Enhetsregisteret.

Enhetsregisteret contains detailed information about the universe of all firms in Norway. Every organization has a right for a free registration and receives a unique organization number afterwards. Among a wide range of variables I am especially interested in industry code. The industry codes are assigned according to Industrial Classification 2007 (Statistics Norway 2007) or Standard for næringsgruppering (SN 2007). This information enables me to exclude firms whose business activity is not subject to VAT, such as financial, education, health services etc.

It would be interesting to explore bunching behavior across the groups subject to different VAT rates, standard or reduced. I would assume that the industry code could implicitly point to the applicable VAT rate. But in absence of any Standard, which unambiguously matches a value of industry codes with a VAT rate, the manual process of firms’ allocation is time consuming as well as imprecise. This will not be a part of my thesis.

Thus, the final data set contains 55 951 observations. On firm-level characteristics, the dataset includes 2 forms of business organization: AS – 3,91%, ENK – 96,09%. The majority is represented by sole proprietorship that proves the remark in the beginning of the section about objects of interest. Usually, AS is an individual or family-owned small company that does not use public investments to raise capital. According to the rules of establishing AS, such companies must have a stock capital of at least NOK 30 000. In addition, depending on the size of turnover, balance sheet total or number of employees, the firm must have an auditor. Sole proprietorship entity has obvious advantages in an absence of minimum equity, no requirements for auditing or registration, and no fee for the Foretaksregisteret. This may significantly reduce compliance costs.

The data sample is restricted to individuals between age 19 and 93. Despite the wide range of age distribution, which reaches its max value of 93 years, 90% of the data lies below the age of 62, and the average age of entrepreneurs is around 44 years old. I expect that the behavioral response to the kink can vary across agents. I define variation on an owner-level, within such
demographic characteristics as gender and country of birth. Descriptive statistics on the owner-level characteristics is presented in Table 3. In the present thesis, immigrant status is based on country of birth. Country of birth is a dummy variable. It equals to 1 if the individual was born in Norway and 0 if the individual was not born in Norway. In the full sample, 87% of individuals are represented by native population; namely born in Norway. The percentage of immigrant entrepreneurs is quite low. Vinogradov and Isaksen (2008) associate it mostly with a low survival rate of such businesses.

Table 3: Owner-level descriptive statistics of the final sample.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country of birth</td>
<td>55951</td>
<td>0.87</td>
<td>0.34</td>
</tr>
<tr>
<td>Gender</td>
<td>55951</td>
<td>0.71</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Gender is a dummy variable as well. The table shows a 70% dominance of men among analyzed entrepreneurs. Worldwide, women are considered to have a great potential to contribute to economic growth as entrepreneurs.

One would therefore expect a country like Norway, with an almost equal male and female employment rate and a high general gender equality, to have comparatively high ratios of female to male entrepreneurship. Yet, women constituted only about 25 per cent of early-stage entrepreneurs in Norway in 2010, which is lower than in most other industrialized countries (Kelly et al., 2011 qtd. as cited in Raknerud & Rønsen, 2014, p.4).

The rate has now reached 30%. Such unbalance captures differences between men and women both in the propensity to become an entrepreneur, and in the propensity to keep being an entrepreneur. Among all reasons for this, I will mention some: a difference in acquiring start-up capital, psychological and motivational differences, dissimilar educational backgrounds and experience, differences between women and men in their response to the family and household situation, partner’s individual characteristics as entrepreneur status and educational level. “The question of why there are so few female entrepreneurs has long been
in the forefront of entrepreneurial research, but remains a puzzle even today” (Raknerud & Rønsen, 2014, p.25).

The sample is unevenly balanced with respect to the mentioned characteristics. Average taxable income on owner and firm levels is presented in Table 4. The central tendency shows that all values lies below the threshold of NOK 50 000. On firm-level, representatives of private companies limited by shares have an average taxable income of NOK 29 894. This is almost equal to the minimum required stock capital of at least NOK 30 000. The lowest indicator in the table, NOK 27 082, is presented as an interaction between private companies limited by shares and female.

Table 4: Average taxable income on owner- and firm- levels.

<table>
<thead>
<tr>
<th>Taxable income across owner-level characteristics ↓</th>
<th>Private company limited by shares (ÅS)</th>
<th>Sole proprietorship (ENK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxable income across firm-level characteristics →</td>
<td>29 894</td>
<td>39 385</td>
</tr>
<tr>
<td>Country of birth</td>
<td>30 010</td>
<td>38 852</td>
</tr>
<tr>
<td>Norway</td>
<td>28 120</td>
<td>42 839</td>
</tr>
<tr>
<td>Not Norway</td>
<td>30 382</td>
<td>39 942</td>
</tr>
<tr>
<td>Gender</td>
<td>27 082</td>
<td>38 048</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On average, males have a higher taxable income than women. Sole proprietorships have almost NOK 10 000 more in the average taxable income. This notable gap may point to a high personal involvement and motivation of sole proprietorships’ owners. A sole proprietorship experiences a risk of all liabilities incurred by the entity, but as the owner receives all the profit flow. On an owner-level, despite the low representation of 13% of the sample, the average taxable income of individuals who were born not in Norway stands out and amounts to NOK 42 568. If we consider the representatives at intersection with sole proprietorships, then we will see the highest average income among all groups in Table 4.
6 Empirical results

6.1 Overall response

In Figure 7, a navy blue sharp line plots the empirical distribution of entrepreneurs in the full sample. The upper value of taxable income amounts to NOK 100 000. The empirical distribution can be interpreted as random noise around a weakly decreasing red curve, when the weakly decreasing red curve is really the smoothed, polynomial curve. Simple eyeballing enables one to detect an obvious increase in firms’ frequency below the threshold of NOK 50 000.

Figure 7: Bunching at the VAT threshold, years 2004 – 2013, 7th order polynomial.

The lower $s_L$ and the upper $s_H$ limits are illustrated in the figure with outside dashed red lines respectively. For the sake of precision, I set the bin width as equal to NOK 500. The VAT threshold corresponds to a bin No. 100. I also checked portioning in bins with a width equal to NOK 1000 and received approximately the same indicators of $s_L$ and $s_H$. The specification of the polynomial may have an effect on the determination of the upper limit $s_H$ and relative
excess mass. I visually determine the lower limit at the same level for all specifications. Examining a data plot, as well as a pattern in a plot of the residuals versus the predicted values helps to determine if a higher order polynomial relationship exists. In existing literature, a polynomial of order 7 is often used exogenously to model the research question. To choose the best fitting model, I look over several specifications, beginning with a polynomial order 1 to 10. I use forward selection based on the Akaike information criterion (AIC), the Bayesian information criterion (BIC) and $R^2$ adjusted. Polynomials of order 8 and higher require rescaling of parameters, but they do not bring sufficient changes for determination of the upper limit $s_H$ and relative excess mass. Sensitivity analyses with respect to the order of the polynomial and the excluded bunching region are presented further. The most appropriate models of lower and higher polynomial degrees for the overall response are listed in a Table 5 and graphically presented in Appendix Figure C. For my analysis I use polynomial of order 7. Taking it as a baseline, I try different default settings for the model, namely different lower limits $s_L$, and observe changes in the estimates of the upper limit $s_H$ and relative excess mass. Results are presented in Table 6.

Table 5: Model specifications.

<table>
<thead>
<tr>
<th>Polynomial order</th>
<th>Lower limit, $s_L$ (NOK)</th>
<th>Number of bin</th>
<th>Higher limit, $s_H$ (NOK)</th>
<th>Number of bin</th>
<th>Relative excess mass</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>47 000</td>
<td>94</td>
<td>52 500</td>
<td>105</td>
<td>0.015</td>
<td>0.0002</td>
</tr>
<tr>
<td>6</td>
<td>47 000</td>
<td>94</td>
<td>73 500</td>
<td>147</td>
<td>0.045</td>
<td>0.0007</td>
</tr>
<tr>
<td>7</td>
<td>47 000</td>
<td>94</td>
<td>68 500</td>
<td>137</td>
<td>0.04</td>
<td>0.0008</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>94</td>
<td>60</td>
<td>120</td>
<td>0.02</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

Table 6: Variation of bunching region.

<table>
<thead>
<tr>
<th>Lower limit, $s_L$ (NOK)</th>
<th>Number of bin</th>
<th>Higher limit, $s_H$ (NOK)</th>
<th>Number of bin</th>
<th>Relative excess mass</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 000</td>
<td>92</td>
<td>69 000</td>
<td>138</td>
<td>0.026</td>
<td>0.0006</td>
</tr>
<tr>
<td>47 000</td>
<td>94</td>
<td>68 500</td>
<td>137</td>
<td>0.04</td>
<td>0.0008</td>
</tr>
<tr>
<td>48 000</td>
<td>96</td>
<td>67 500</td>
<td>135</td>
<td>0.07</td>
<td>0.001</td>
</tr>
</tbody>
</table>
As $s_L$ is pinned down, there is tendency for $s_H$ to grow in order to balance excess and missing masses. This makes the bunching region wider and the relative excess mass smaller. An intuitive explanation for this is that I do not include bunching firms, whose deviations from counterfactual distribution do not influence the absolute value of excess mass below the threshold notably, but increase the number of bins in the bunching region. Therefore relative excess mass goes down. In contrast, the missing mass above the threshold may be diffused along a wide range of the distribution. Restricting $s_L$ closer to the threshold, and respectively decreasing $s_H$, may not capture all behavioral responses in the sample.

Conditional for these settings is that the bunching behavior begins at the mark of NOK 47,000 (bin No. 94) and ends at NOK 68,500 (bin No. 137). The bunching region is asymmetric. Below the threshold the bunching region is small, around NOK 3,000, and according to the figure it looks more like a dot mass. The firms want to deviate as closely as possible to the threshold. Above the threshold the missing mass is quite spread and the upper limit reaches NOK 18,500. A possible explanation for such a wide region was given in section 3.1, that individuals above the marginal buncher reduce their earnings in response to a higher marginal tax rate and fill up a postkink hole. The default settings give me a value of the relative excess mass equal to 0.04 with a standard error of 0.0008. I reject the null hypothesis that there is no relative excess mass at the kink relative to counterfactual distribution.

In absolute terms, the obtained values are lower compared to similar studies in Finland. However in general, the amplitudes of the approaches correspond. Recall that the threshold in Norway is even smaller than in Finland, which makes the study sample smaller and capturing the effect harder. The VAT registration in Finland is based on firms’ annual sales. Moreover, those small businesses that are exempt from VAT in Finland still “need to report their overall sales for income tax purposes. Therefore, we have data on the annual sales of firms below the threshold, as this information is reported to the Tax Administration that allows easier data collection” (Harju et al., 2016, p.9). This makes data collection in Finland much easier and more precise, while this is not the case in Norway. It is quite problematic to gather data for the smallest firm sizes. Recall section 5, for my analysis I use entrepreneurs’ income as earned income derived from active participation in a trade or business. I suspect that this can be a threat to external validity. But nevertheless, the evidence is strong and a significant amount of bunching has been detected.
6.2 Heterogeneity in response

To prove the hypothesis that agents across groups on owner and firm levels may respond differently to the VAT threshold, I estimate relative excess mass in different subsamples. An important common observation is the presence of bunching behavior in almost every group. It points to a complicated structure of the overall response, and demands more thorough analysis for the causes.

6.2.1 Country of birth

Figure 8 shows bunching behavior at the threshold for representatives with Norwegian and immigrant background respectively. I find visual comparison of the two graphs difficult due to the large difference in the number of observations between the subsamples. Notice the different scales on the vertical axes. The maximum value for the y axis, denoting firms’ frequency, on the left graph is around 1000, which is 10 times larger than on the right graph. As was pointed in section 5, representatives who were born not in Norway amount to only 13% of the full sample. The bunching behavior is detected in both groups.

Figure 8: Bunching at the VAT threshold, responses in subsamples in the context of country of birth.

Specifications, used to obtain estimates of interests in both subsamples, are presented in Table 7. For analysis I use a polynomial of the 7th order and set the same lower limit of the bunching region. Response of representatives, who were born in Norway, coincides almost precisely with the overall response in section 6.1, both in value of relative excess mass and determination of the upper limit of the bunching region. It is not surprising, taking into account their share in the study sample. With approximately the same bunching region, relative excess mass for representatives with immigrant background is twice as high as
relative excess mass for native representatives. Results should be viewed with caution due to the small size of the subsample.

Table 7: Model specifications, subsamples in the context of country of birth.

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs</th>
<th>Mean taxable income</th>
<th>Polynomial order</th>
<th>Lower limit, ( s_L ) (NOK)</th>
<th>Number of bin</th>
<th>Higher limit, ( s_H ) (NOK)</th>
<th>Number of bin</th>
<th>Relative excess mass</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born in Norway</td>
<td>48628</td>
<td>38 478</td>
<td>7</td>
<td>47 000</td>
<td>94</td>
<td>68 500</td>
<td>137</td>
<td>0.036</td>
<td>0.0007</td>
</tr>
<tr>
<td>Born not in Norway</td>
<td>7323</td>
<td>42 568</td>
<td>7</td>
<td>47 000</td>
<td>94</td>
<td>69 000</td>
<td>138</td>
<td>0.066</td>
<td>0.005</td>
</tr>
</tbody>
</table>

The latest studies show that immigrant entrepreneurs cannot be treated as a homogeneous group. In viewing immigrant entrepreneurship, Chrysostome (2010) considers necessity immigrant and opportunity immigrant entrepreneurs. Representatives of the first group are involved in the business activity because they cannot participate in a host-country labor market due to certain challenges. The second group chooses freely and is driven by profit maximization purposes. We see that individuals initially have different reasons to undertake the business, and consequently different motivations to continue, which in turn determines the decision making process.

Besides this, taking into account the significance of compliance costs for small businesses, I would suggest their notable increase for immigrant entrepreneurs at the VAT threshold. Simply, due to linguistic disadvantages and unfamiliarity with business culture, the entrepreneurs may find it more costly to deal with tax authorities and have incentives to stay below the threshold. Obviously, this is highly determined by the degree of integration of the entrepreneur in the host-country, Norway.

In addition, cultural differences play a great role. Hofstede (1980) studied such cultural dimension as an uncertainty avoidance. Different countries can be compared by the Uncertainty Avoidance Index (UAI), which indicates that some people are more comfortable under uncertainty than others. A low index is associated with people who are more likely to take risk and more comfortable with ambiguity. They tend to act freely and be more entrepreneurial. In contrast, the high UAI indicates people who strictly follow rules and
traditions. For example, Norway has a score of 50. The majority of the representatives in my data sample who were not born in Norway, are represented by Polish entrepreneurs. Poland has a score of 93, which points to a risk-averse behavior. Intuitively, entrepreneurs prefer not to leave their “comfort zone”.

Through bunching, immigrant entrepreneurs restrain their own growth. Vinogradov (2008) in his doctoral thesis summarized reasons for this, and why poor performance of precisely immigrant entrepreneurs may be undesirable for the economy and society in Norway. Recall necessity immigrants, in their case entrepreneurship helps to bypass barriers, which immigrants face on the host-county labor market and increases labor mobility. Providing such job opportunities is especially important for unattractive locations with a high concentration of immigrants, rising unemployment rates and poverty. Immigrant businesses are highly involved in international trade. They create new trade links by diversifying supply and providing new products and services to the host-country market. In general, they contribute to transnationalism and globalization. Socially, a rise in immigrant business may affect the next generation, as children of well-off immigrants can have access to better education, provide work experience and encourage other immigrants to start their own business, contributing to social interactions in ethnic minorities. A clear understanding of reasons for bunching would help to improve corresponding policies and stimulate immigrant businesses’ growth.

6.2.2 Gender

Now let’s look at differences in responses to the VAT threshold between men and women. Studies by Rosa, Carter, and Hamilton (1996) used VAT registration as an indicator of small businesses performance, because the business requires more formal management above the threshold. “The businesses of male respondents are significantly more likely to be registered than those of female respondents” (Rosa et al., 1996, p.467). Results of Harju et al. (2016) also show higher relative excess mass for women. They associate the finding with marital status and a secondary earner position in the household, which in turn implies large tax elasticity. But this explanation is suggested as a potential, and is not confirmed empirically in the paper. My analysis shows that the relative excess mass for men is larger than the relative excess mass for women. Thus male entrepreneurs bunch more actively than female
entrepreneurs at the VAT threshold. Table 8 presents obtained estimates for subsamples of male and female entrepreneurs respectively.

Table 8: Model specifications, subsamples in the context of gender.

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs</th>
<th>Mean taxable income</th>
<th>Polynomial order</th>
<th>Lower limit, ( s_L ) (NOK)</th>
<th>Number of bin</th>
<th>Higher limit, ( s_H ) (NOK)</th>
<th>Number of bin</th>
<th>Relative excess mass</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>39808</td>
<td>39,494</td>
<td>7</td>
<td>47,000</td>
<td>94</td>
<td>70,500</td>
<td>141</td>
<td>0,043</td>
<td>0,001</td>
</tr>
<tr>
<td>Female</td>
<td>16143</td>
<td>37,828</td>
<td>7</td>
<td>47,000</td>
<td>94</td>
<td>65,000</td>
<td>130</td>
<td>0,032</td>
<td>0,0015</td>
</tr>
</tbody>
</table>

For analysis, I use a polynomial of the 7th order and set up the same lower limit of bunching. My commensurate results of male and female bunching give similar patterns of behavior in management and business strategies between the genders. The difference in relative excess masses is not striking, but at the same time the bunching region for male representatives is noticeably wider. It ends further from the threshold and closer to the point of NOK 70,500. The behavioral response to the VAT threshold is represented by the left shift of distribution above the threshold due to an adjustment to the higher marginal tax. As in the male subsample, the larger diapason is affected and I interpret this as indicator of a more systematic and deliberate bunching behavior of male entrepreneurs. Graphically, distributions for men and women along taxable income are presented in Figure 9.

Figure 9: Bunching at the VAT threshold, responses in subsamples in the context of gender.

The relationship between gender and small business performance are always complex, and existing studies bring mixed results. A large heterogeneity of representatives demand better
quantitative data and information for analyzing exact causes of the bunching behavior. For a better understanding of bunching behavior, I would focus on studying business performance for men and women engaged in business activities. Namely, which factors may influence attitude to growth and development of the business, rather than to become an entrepreneur in the first place. Raknerud and Rønsen (2014) have provided a rich literature review on gender gap in entrepreneurship. In the context of psychological and motivational factors, it has been suggested that women are both more risk-averse and less competitive than men. Men are more motivated by status attainment, while women are more motivated by achievement and recognition. Gender gap may be associated with a type of business. The way women choose an industry sector is narrowed by traditional expectations for competence, and their choice of field of education. According to the report “Facts about education in Norway 2017 – key figures 2015” by Statistics Norway (2017), women are still leading in such fields as “Health, welfare and sport”, “Education and Law” and “Social Sciences and Law”. This corresponds to statistics on established businesses, according to Statistics Norway (2015). Even in the case of appropriate education, women’s underperformance is associated with a lack of job experience and role models in entrepreneurship, which serve as a source of accumulated knowledge and experience gain. A special place is assigned to family policy. Women are entrusted with the main responsibilities for the household and childcare. To a large degree, this limits female flexibility and prevents them from concentrating on business development. A great share of the businesses is kept as part-time and home-based. Interestingly, it is not just marital status as a categorical variable, but so called intra-household transfer of human capital that is currently being studied more closely. This includes how status, knowledge and experience of a partner influence business activity in a particular household.

6.2.3 Forms of business organization

The comparison subsamples in the context of forms of business organization is challenging due to the imbalance in sizes of the subsamples. However, the obtained results are interesting to interpret. Estimates and model specifications for investigation of bunching behavior in the context of forms of business organizations are presented in Table 9. I use a polynomial of the 7th order and set up the same lower limit of bunching NOK 47 000, which is determined visually using Figure 10.
An empirical distribution of AS firms does not reveal relative excess mass in a firms’ frequency just below or exactly at the threshold, due to crossing at NOK 50 000. This finding seems quite logical, because my key assumption from section 5, that studied micro data on income derived from active participation in a trade or business reflects entity’s turnover, is violated for AS. On the owner’s hand, the business profit is taxed through dividend and capital gain taxation. Over time these will reflect the turnover, but each year the AS may retain more or less of its earnings. The data I have used will not reflect each year’s turnover.

Bettendorf, Lejour, and van ’t Riet (2016) discuss tax bunching by owners of small corporations in Netherlands. Due to small corporations facing taxation of corporate, labor and capital income, a large part of the behavioral response of owners is revealed through shifting between tax bases, namely wages and dividends. Behavior and values of estimates of ENK representatives are very similar to the overall response. This is not surprising, as they amount to 96% of the pooled sample. I suppose that the bunching behavior is driven by fundamental reasons, discussed in section 3.3.

Table 9: Model specifications, subsamples in the context of forms of business organization.

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs</th>
<th>Polynomial order</th>
<th>Lower limit, $s_L$ (NOK)</th>
<th>Number of bin</th>
<th>Higher limit, $s_H$ (NOK)</th>
<th>Number of bin</th>
<th>Relative excess mass</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private company limited by shares (AS)</td>
<td>2 190</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No evidence of bunching behavior</td>
<td></td>
</tr>
<tr>
<td>Sole proprietorship (ENK)</td>
<td>53 761</td>
<td>7</td>
<td>47 000</td>
<td>94</td>
<td>69 000</td>
<td>138</td>
<td>0,039</td>
<td>0,0008</td>
</tr>
</tbody>
</table>
Figure 10: Bunching at the VAT threshold, responses in subsamples in the context of forms of business organization.
7 Conclusion

The purpose of my master thesis has been to investigate the behavior of small businesses in response to implemented tax policy in Norway, looking at the VAT threshold in particular. Exploring available data on Norwegian entrepreneurs with a taxable income from the business activity up to NOK 100 000, I showed evidence of bunching behavior at the VAT threshold. This response is mostly driven by sole proprietorship entrepreneurs. Detailed follow-up studies of the topic across different groups confirmed the obtained results. The existence of bunching behavior in every group points to a fundamental system issues for agents, which slightly differs across gender or country of birth.

Bunching is an informative policy-induced distortion, which calls for focus on a policy setting. I would like to make a conclusion of this thesis in the form of recommendations to the administration, which is responsible for the design of an efficient tax environment. To date, they are presented only by theoretical considerations, which should be subjected to additional research.

The research field is wide and bunching behavior cannot be easily explained by just one discipline. It involves knowledge of economics, law, sociology and psychology. To estimate precise causal effects, more extensive analysis is required. But discussions in existing literature and attempts to interpret the obtained results in certain policy settings are forcing us to pay closer analytical attention to the compliance costs of firms. “Much emphasis is often given, in particular, to the regressive nature of the compliance costs associated with the VAT, generally thought to be more burdensome, relative to value added, for smaller traders than large” (Keen & Mintz, 2004, p. 574). As the VAT threshold in Norway is very low, benefits from larger sales may not dominate the compliance costs, due to crossing the threshold. The latest studies in Armenia by Asatryan and Peichl (2016) correspond to this intuition. In the presence of a high registration VAT threshold, evidence of bunching behavior was not found.

The question of an optimal value for a VAT threshold in Norway can arise. “Given that, in most countries, the value-added base is concentrated among relatively few firms, a high threshold is, by far, the most efficient approach” (Ebrill et al., 2002, Best practices in design, para. 2). In practice, countries tend to overestimate the impact of small firms’ revenue and set low VAT thresholds, while this may be outweighed by collection costs. Logically, in the
absence of collection costs, it may be efficient to not implement a VAT threshold at all. There are examples where countries have 0 VAT thresholds, for example Chile, Mexico, Spain, Sweden and Turkey. Keen and Mintz (2004) cover both views with a well documented approach for the determination of an optimal VAT threshold as a compromise with the government between tax revenues lost, and saved collection costs. They suggested the existence of two local optima:

*a low threshold, with high collection costs offset by a relatively low level of production inefficiency and a relatively high level of revenue; the other has a relatively high threshold, with relatively low revenues offset by relatively low collection costs and production inefficiency* (Keen & Mintz, 2004, p.572).

Both cases minimize the unequal treatment of a majority of agents below and above the threshold. Researchers have emphasized the importance of the VAT design not only in terms of revenue collection, but as it creates links to other tax policies. A change in the VAT threshold is closely related to the determination of optimal audit strategies, and influences income tax administration.

By crossing the threshold, small firms immediately face the administrative burden in full. But in world practices there exist intermediate policies, which help to smooth differences in the treatment of agents on both sides of the threshold. For example, there are optional VAT flat rate schemes for small businesses in the UK. Under this scheme, firms do not have to calculate VAT from every transaction, but a predetermined flat rate percentage to the business turnover of the VAT period. This may be assumed as a gradual transition and an adaptation to the full administrative burden for small businesses, which may reduce the compliance gap.

Special attention to small companies was paid by the European Commission (2016) during the development of the VAT Action Plan “Towards a single EU VAT” area in 2016. The main problems, burdensome VAT rules due to higher VAT compliance costs (than for large enterprises) and the threshold effect were realized. This led to a simplification of regulatory framework and the development of a package for small companies. The evaluation and impact assessment work is ongoing. One of the propositions claimed a treatment of occasional traders as non-taxable persons. Included in occasional traders are small entrepreneurs, who only make supplies on an occasional basis. This is worth thinking about, as this option may
exclude the bunching effect due to deregistration costs, which were discussed in section 3.3, when occasional surpluses do not lead to following VAT calculation in two years on sales below the threshold.

To reduce the compliance gap, measures aimed at improving interactions between taxpayers and the tax administration need to be taken. It is important to provide early and timely assistance to agents, who may be confused by the complexity of the law and have a lack of meaningful taxation knowledge. It is imperative to not discourage them from complying at the beginning of business activity. There exists a positive correlation between non-compliance and dissatisfaction of taxpayers, their expectations and beliefs about unhelpful or inefficient tax authority. No less important is creating a positive public image that improves attitudes toward government and tax compliance, as public opinion is crucial. Agents may have a wounded sense of justice, “several studies indicate that taxpayers’ perception of the equity of the tax system affects their compliance behavior” (Morse et al., 2009, p. 41).

It is not only a personal assessment of risk, i.e. one agent is more risk averse than another, that influences tax compliance, but a perception of minimal risk in the industry sector where the firms operate. Several studies report that non-compliance behavior can be explained largely by an opportunity for non-compliance. Nevertheless, Liu and Lockwood (2016) “show that opportunities for evasion will increase voluntary registration and have an ambiguous effect on bunching. The latter result is somewhat surprising, as it is usually assumed in the empirical literature that bunching is facilitated by evasion opportunities” (p.3). A question arises of whether the government should enforce stronger penalties to prevent entrepreneurs from non-compliance. According to Doran (2009), the answer depends on the particular reasons for a taxpayers’ behavior, and suggests to the policy maker completely opposite solutions. If taxpayers are driven only by economic intuition, i.e. costs of compliance are larger than costs of sanctions, that reflects a deterrence model. Following this model, penalties and sanctions should be increased to outweigh the expected gain from non-compliance. Stronger penalties will help to convince people that everybody is complying. An agent’s attitude towards tax compliance is formed with an eye on peers. The understanding of compliance behavior of others determines one’s own decision, “a substantial body of research shows that taxpayers who believe their peers evade tax are more likely to evade tax themselves” (Morse et al., 2009, p.40). But if the behavior of taxpayers falls under a norm model, it means that the defining factors of taxpayer’s behavior are specific social or personal
norms, for example, respect to legislation. Then strengthening sanctions and penalties will lead to a demonization of the government and undermine tax compliance.

In any case, manipulations with sanctions are considered to bring only a short-term effect. OECD Guidance note “Compliance Risk Management: Managing and Improving Tax Compliance” (2004) suggests, “individual responses to positive incentives are greater than the responses to deterrence factors” (p.51). They provide an example of a temporary VAT policy in the UK in 2003, aimed at improving tax compliance among businesses who failed to register for VAT, while their turnover was higher than the threshold for over 18 months. The scheme proposed a relief from sanctions for belated notification, leaving still applicable sanctions for arrears of tax due since the correct registration date. An advanced concept of this scheme “was that it made sense to give businesses which should have registered some time ago an incentive to come forward voluntarily rather than take the chance of waiting for these more traditional methods” (ibid). Under this policy, a huge amount of work has been done by public relations by means of professional advertisement. Close interaction with potential taxpayers was achieved through detailed consultations. The discrimination effect was excluded by equal treatment of cheaters and honest-but-confused taxpayers. A tax policy was temporary changed by relaxing deterrence factors, which in addition increased awareness of ignorant agents. As a result, after six months of such a regime, over 3000 businesses were better off through using the scheme, as well as bringing millions in as tax revenue.

The last example shows that the recommendations, presented above, are not exhaustive and not comparative. Applying a single strategy that would solve all problems is unlikely. It is with a high probability that a possible treatment implies inclusion of several well-balanced strategies and still leaves room for improvement.
Bibliography


A Methods for calculating VAT

The examples of two different methods of VAT calculation are taken from White Paper “An introduction to the value added tax (VAT)” by the U.S. Chamber of Commerce (U.S. Chamber of Commerce, n.d.), where the information about advantages and disadvantages of using these methods can be found.

Credit-invoice method VAT with 10% rate applied

Assume Wheat Farmer grows, harvests, and sells wheat to Miller for $50, paying a $5 VAT: 10% x $50 = $5.
Miller processes the wheat into flour and sells it to Baker for $150, paying a VAT of $10: 10% x $150 = $15
$15 – inputs credit of $5 paid on previous business inputs by Wheat Farmer, as reflected on the invoice received = $10.
Baker bakes the wheat into bread and sells it to Retailer for $300, paying a VAT of $15: 10% x $300 = $30
$30 - inputs credit of $15 paid on previous business inputs paid by Wheat Farmer and Miller = $15.
Retailer sells the bread to consumers for $500, paying a VAT of $20: 10% x $500 = $50
$50 - inputs credit of $30 paid on previous business inputs paid by Wheat Farmer, Miller, and Baker = $20.
In this example, a total of $50 VAT has been paid to the government in four stages. The same logic is used if standard or reduced rates are implemented.

Table A1: Tax cascading with credit-invoice method VAT.

<table>
<thead>
<tr>
<th>Business</th>
<th>Purchases ($)</th>
<th>Sales ($)</th>
<th>Credit for business Inputs ($)</th>
<th>Tax on sales of Outputs ($)</th>
<th>VAT Liability ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat Farmer</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Miller</td>
<td>50</td>
<td>150</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Baker</td>
<td>150</td>
<td>300</td>
<td>15</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Retailer</td>
<td>300</td>
<td>500</td>
<td>30</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>500</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Subtraction method of VAT with 10% rate applied

Assume that each business only purchases from the business listed above it, and that each purchase amount is the total for the period. Each business takes its total sales for the period and subtracts its total purchases for the period. It then multiplies the result by 10% to calculate its VAT. In this example, a total of $50 VAT has been paid to the government in four stages.
by the businesses, but has been calculated based on total transactions for the period, rather than individually on single transactions as was done with the credit-invoice method.

Table A2: Tax cascading with subtraction method VAT.

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<th>Business</th>
<th>Total purchases ($)</th>
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<th>Sales minus purchases ($)</th>
<th>VAT Liability ($)</th>
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B Comparative information about VAT rates and thresholds in OECD member countries

Table B1: VAT rates in OECD countries years 2005 – 2016.

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Source: OECD (2016a), Table 2.A2.1.
| United Kingdom | GBP | R | 82 000 | 118 841 | Yes |

Source: OECD (2016a), Table 2.A2.3.
C Graphical representation of bunching behavior at the kink, using polynomials of 5th, 6th and 8th order

Figure C.1: Bunching at the VAT threshold, years 2004 – 2013, 5th order polynomial.
Figure C.2: Bunching at the VAT threshold, years 2004 – 2013, 6th order polynomial.

Figure C.3: Bunching at the VAT threshold, years 2004 – 2013, 8th order polynomial.