Does Household Tax Credit Increase Demand and Employment in the Service Sector?

Jarkko Harju, Sami Jysmä, Aliisa Koivisto, Tuomas Kosonen

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Abstract

This report studies the effects of household tax credit (HTC). We use data from the Tax Authorities in Finland and Sweden. These data are firm-level monthly value added tax reports, annual income tax filings and individual-level reports on the usage of HTC. In addition, we use self-collected survey data focusing on the usage of HTC and the rules of the HTC system.

The survey results show that approximately 20% of the working age population in Finland use services that are eligible for the HTC. These results also show that individuals are not very aware of the HTC rules, and our analysis using administrative data also supports this observation. Our descriptive analysis shows that the HTC system is highly regressive, i.e. high-income individuals claim a large share of the HTC.

Our results using register data show that at best the HTC system has very limited effects on the consumption of services and employment in the service sector. We also do not find evidence that the HTC is efficient in reducing tax evasion. Therefore, our results suggest that expansion of the HTC system would be inefficient in spurring demand and employment and in reducing tax evasion. These results are also very well in line with previous studies that focus on estimating the effects of reduced VAT rates on prices, demand and employment.

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Keywords household tax credit, employment, tax evasion, service sectors, service consumption, income distribution, research, research activities

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Kuvailulehti

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Lisääkö kotitalousvähennys palveluiden käyttöä ja työllisyyttä palvelualoilla?

Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 2021:1

Julkaisija	Valtioneuvoston kanslia		
Tekijä/t	Jarkko Harju, Sami Jysmä, Aliisa Koivisto, Tuomas Kosonen		
Kieli	englanti	**Sivumäärä**	111

Tiivistelmä

Tässä selvityksessä tarkastelemme kotitalousvähennyksen vaikutuksia. Aineistona käytämme Suomen ja Ruotsin verohallinnoilta saamaamme yritystason aineistoa kausiveroilmoituksista, yritystason vuosittaisista tuloverotiedoista sekä kotitalousvähennyksen käytöstä. Käytämme tutkimuksessa myös itsekeräämäämme kyselyaineistoa kotitalousvähennyksen käytöstä ja vähennykseen liittyvistä säännöistä.

Kyselyyn perustuvat tuloksemme osoittavat, että noin 20 % työikäisistä ihmisistä käyttää kotitalousvähennykseen oikeuttavia palveluita, ja että ihmiset eivät ymmärrä tai tunne kotitalousvähennykseen liittyviä sääntöjä kovin hyvin. Tätä tukee myös rekisteriaineistoilla tehty analyysi. Kuvailevat tuloksemme osoittavat, että kotitalousvähennys on hyvin regressiivinen.

Rekisteriaineistolla tekemämme analyysi paljastaa, että kotitalousvähennyksen vaikutukset palveluiden kysyntään ja työllisyyteen ovat hyvin pieniä. Emme myöskään havaitse kotitalousvähennyksellä olevan vaikutuksia veronkierron määrään. Tuloksemme tarkoittavat sitä, että kotitalousvähennysjärjestelmän laajennus olisi tehoton keino lisätä palveluiden kysyntää ja siten myös työllisyyttä sekä vähentää veronkiertoa. Tuloksemme ovat hyvin linjassa aiempaan tutkimuskirjallisuuteen, jossa havaitaan, että kysyntä näillä palvelualoilla on jäykkää, eivätkä hintamuutokset siten johda juurikaan kysyntämuutoksiin.

Asiasanat kotitalous, vähennykset, työllisyys, harmaa talous, tutkimus, tutkimustoiminta

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Presentationsblad

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Ökar hushållsavdraget användningen av tjänster och sysselsättningen inom servicebranschen?

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Utgivare	Statsrådets kansli		
Författare	Jarkko Harju, Sami Jysmä, Aliisa Koivisto, Tuomas Kosonen		
Språk	engelska	**Sidantal**	111

Referat

I denna rapport granskar vi hushållsavdragets verkningar. Vårt material består av årliga uppgifter om inkomstskatt på företagsnivå, periodskattedeklarationer och uppgifter om användning av hushållsavdrag som vi fått från Finlands och Sveriges skatteförvaltningar. I vår undersökning använder vi även enkätmaterial som vi själva samlat in om användning av hushållsavdrag samt om föreskrifter kring avdraget.

Våra enkätresultat visar att ca 20 % av personer i arbetsför ålder använder tjänster som berättigar till hushållsavdrag och att människor inte förstår eller känner till föreskrifterna om hushållsavdraget. Detta stöds även av vår analys av registermaterialen. Våra beskrivande resultat visar att hushållsavdraget är mycket regressivt.

Vår analys av registermaterialen avslöjar att hushållsavdraget påverkar efterfrågan på tjänster och sysselsättningen i väldigt låg grad. Vi har heller inte sett att hushållsavdraget skulle påverka förekomsten av skatteflykt. Våra resultat innebär att en utvidgning av hushållsavdragssystemet vore ett ineffektivt sätt att öka efterfrågan på tjänster och därmed även sysselsättningen eller att minska skatteflykt. Våra resultat är i linje med tidigare forskningslitteratur, som observerat att dessa servicebranscher har en stel efterfrågan och att prisändringar därmed inte leder till nämnvärda ändringar i efterfrågan.

Nyckelord

hushållsavdrag, sysselsättning, dold ekonomi, servicebranschen, konsumtion av tjänster, skattestöd, inkomstfördelning, forskning, forskningsverksamhet

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Contents

1 Introduction

Governments use various policies that aim to boost employment by increasing the consumption of labor-intensive services, and increase tax revenue by reducing tax evasion. One such effort has been to use special tax treatments and subsidies to spur demand for services in labor-intensive industries. The EU, for example, has allowed member states to reduce VAT rates on labor-intensive services. Another commonly used strategy has been to provide tax credits for consumers in sectors providing household services such as renovation and cleaning services. These so-called household tax credits (HTC) are used in Europe in various countries such as France, Finland and Sweden. This special tax treatment allows taxpayers to deduct a share of the labor costs against their income tax, effectively lowering the price of the services. Thus, the aim of HTC is to boost the consumption of services through lower consumer prices. Government spending on these is comparable to, or even higher than, the lost tax revenue due to reduced VAT rates in labor-intensive sectors. However, unlike the effects of reduced VAT (see e.g. Kosonen 2015 and Harju et al. 2018), little is known of the effects of HTC, especially the effects of HTC on the consumption of services, employment or the shadow economy.

In this study, we provide a comprehensive analysis of HTC policies in Finland and Sweden. We describe various aspects related to the usage of services and HTC and, more importantly for the assessment of policy goals, we evaluate the impact of HTC on the consumption of household services and other outcomes. We utilize changes in HTC details that took place in different years in Finland and Sweden to make the analysis credibly causal. We have access to various data sources to implement this analysis. We use detailed micro-level data on the usage of HTC, a survey on the usage of services and micro-level administrative data on firms providing relevant services in Finland and Sweden. With the empirical design and comprehensive data, we can offer credible evidence on multiple aspects of the effectiveness of HTC policies.

In order to understand the efficacy of HTC policies, we examine how they affect the consumption of household services. Although the main aim of these policies is to increase employment, the mechanism leading to this is that HTC first increases the consumption of services provided by labor-intensive industries. It is unlikely that HTC would increase employment without increasing consumption. Moreover, because HTC is administered by the tax authority, it decreases a firm's incentives to misreport its tax filings. The mechanism also relies on HTC increasing either reported consumption of services or reported services

provided by firms remitting the VAT. Because the consumption of household services is key to understanding the secondary effects on employment and tax evasion, we devote much of the analysis to understanding the consumption patterns of household services, the usage of HTC and how HTC affects these outcomes.

In more detail, we focus on the consumption of cleaning and renovation services and the usage of HTC in these industries using various empirical strategies and rich data sources. We use five different data sources in this analysis: 1) Register data including all HTC claims from 2006 to 2014, 2) firm-level data from Finland and Sweden including the population of firms providing household services, 3) a survey of working-age individuals asking about the consumption of household services and HTC usage, 4) representative register-based data linking HTC and income and 5) the SISU microsimulation model. With these data it is possible to answer various questions, such as to what extent individuals use household services, in what way this is related to HTC rules, what has happened in terms of trends in service consumption and what kind of individuals and firms use or are able to benefit from HTC.

In this paper, we mainly focus on understanding the causal impacts of HTC policies on the consumption of household services in Finland and Sweden. We utilize two empirical settings to do this. First, we compare household service industries between Sweden and Finland over time. Sweden and Finland share similar cultures, apply similar income tax rules and, most importantly, have similar HTC systems. The HTC details differ in ways that allow us to examine the impacts of different institutional details on consumption. Most importantly, the countries have changed details of their tax credit systems at different times, although Finland had its HTC system in place before Sweden introduced it for cleaning services in July 2007. Later, in July 2009, the Swedish system was reformed so that firms rather than consumers claim the HTC, so that the tax credit more immediately affects the prices paid by consumers. We use these sources of variation to study the effects of HTC tax credit in the cleaning industry.

In our second setting, we study the renovation industry with a particular focus on Finland and use other similar industries as a domestic control group. Finland increased the amount of maximum tax credit significantly for the renovation industry in 2009, and thus our empirical strategy is to compare firms operating in the renovation industry with our matched control group before and after 2009. In both settings, we conduct the analysis with firm-level VAT data including reported sales and input usage, to reveal both whether consumption among households has increased and whether tax evasion among firms has decreased.

Our evidence from the survey of working-age individuals in Finland shows that about one fifth of respondents had used household services in the previous 12-month period.

This mirrors quite well the number of individuals who also receive this tax credit in their income taxation. The survey evidence also suggests that knowledge of the replacement rate and the maximum amount of HTC is quite poor. Our administrative data also support this observation as a relatively large share of individuals using HTC-eligible services make mistakes in their reports to the tax authority. This is evident as many individuals claim a lower amount than they are eligible for based on the costs of the services, which makes this type of mistake costly. In addition, as the HTC is an income tax credit, individuals who do not pay enough tax cannot utilize the full amount of HTC. Our descriptive analysis also shows that the HTC is highly regressive – higher-income households use HTC to much greater extent than lower-income households and very poor households hardly utilize HTC at all. This pattern by household income makes HTC even more regressive than, for example, the distributional impact of reduced VAT on groceries and restaurants as these are also consumed by lower-income households but the HTC is mostly not (Riihelä, 2010).

We do not find any statistically significant or economically meaningful effect of HTC on the consumption of household services. First, our best scenario for finding such effects is the introduction of HTC for cleaning services in Sweden. However, we find no increase in the reported value of sales of cleaning firms in Sweden relative to the Finnish firms used as the comparison group. The main identification assumption of our empirical approach is that the value of sales of cleaning service firms moves in line across countries. We find that the pre-reform trends are very similar, validating our empirical approach and mitigating the potential concern that the two groups are not comparable. Around 2007, there were no other concurring effects that could have affected the results. Our analysis of the Swedish reform of 2009 that switched the credit-claiming responsibility from customers to firms does not show any clear increase in service consumption either, but the results are somewhat more mixed. In Sweden, the number of small firms increases more rapidly than in Finland, and also the consumer prices of cleaning services seem to increase somewhat. Since we do not observe any significant increase in aggregate consumption relative to Finland, we attribute the small differential effects observed to the Great Recession, which seems to have affected the two countries differently in other respects too from 2009.

We complete our causal analysis by studying the effects of HTC on the consumption of construction services in Finland. In this analysis, we exploit the 2009 reform that expanded the maximum amount of HTC for renovation services. However, we cannot use Sweden as the control group for Finnish construction firms because the Great Recession treated construction services very differently in the two countries and, in addition, Sweden simultaneously introduced HTC for renovation services. Instead, we use a domestic control group by matching Finnish firms in similar industries that seem to follow similar economic trends prior to the reform. Similarly, as in the cleaning sector, we do not find any evidence of an increase in sales of construction services after the reform relative to the control group that also faced adverse economic conditions. However, due to the non-smooth

economic conditions, we cannot provide very precise estimates for this reform despite our best efforts.

We complete the firm-level analysis by examining annual taxable profits. Our data show an increase in Swedish cleaning sector firms after the Swedish 2009 reform relative to Finnish firms, which is consistent with both the differential effects of the Great Recession in the two countries and with HTC increasing profit margins through higher consumer prices. We also find an increase in the amount of wages paid by these firms. The changes seem to be the largest among small firms, which could indicate that the owners of small firms paid higher wages to themselves as this type of income-splitting between profits and wages is easier for them than for larger firms. However, with our empirical setting, we cannot entirely rule out the possibility of some increase in working hours within these firms.

To sum up our empirical findings, we find that HTC did not significantly increase the value of services sold, indicating that the incidence is on consumers, i.e. they benefited from the policy through lower effective service prices. Moreover, we do not find any consumption responses to the increases in the HTC. These results are consistent with a low elasticity of demand with respect to the after-HTC price of the services. Our descriptive evidence showing that most households do not consume these services and that individuals are not very aware of the details of HTC are potential explanations of this result. But the low demand elasticity suggests that the scope for increasing consumption through the salience of HTC rules is likely to be quite limited. Moreover, the lack of an increase in the amount of reported services sold after an expansion of HTC is consistent with no changes in tax evasion among firms providing these services. If tax evasion had decreased, the reported sales or input usage should have increased, which we did not find in the data. Finally, consistent with this result from the administrative data, our survey did not find much evidence of tax evasion.

Our evidence gives no support for the notion that the HTC system increases consumption of services, employment in services, or reduces tax evasion. Therefore, it seems that the HTC falls short on the stated policy goals of the HTC system. However, Finland's HTC costs the public sector more than EUR 400 million annually. Thus, the cost-benefit calculation of HTC seems to be negative. The optimal income tax literature suggests that the income tax system should be at least somewhat progressive, targeting income transfers more at lower-income than higher-income households. However, HTC is highly regressive, benefiting higher-income individuals much more than lower-income individuals. While the effect of HTC on the progressivity of the tax system is not large given its small share of total taxes, the direction seems to deviate from optimal income tax results.

Our study contributes to a growing literature analyzing different aspects of consumption taxation. The closest studies are those that examine policies that reduce VAT rates on

labor-intensive industries for similar reasons as those aimed for by governments in implementing HTC policies (Kosonen 2015, Harju et al. 2018, Benzarti and Carloni 2019, Benzarti et al. 2020). Reducing a VAT rate is intended to lower consumer prices, which effectively is also the aim of HTC. The results of this literature are largely in line with the results we find in this report. The reduced VAT rate has an incomplete pass-through to prices, but even when prices decline somewhat due to the reduced VAT rate, there does not seem to be any effect in terms of increasing the consumption of services. Instead, the reduced VAT rates seem to benefit the firms. These results, as well as the results found here, all point towards very inelastic demand with respect to prices, at least for these types of services. Therefore, it is not perhaps very surprising that the HTC system does not create large demand responses since changes in VAT rates did not create demand responses either. In addition, one might even think that changes in VAT rates would have a more immediate and salient effect on prices than changes in the myriad rules governing HTC, which could further reduce the effects of HTC.

Studies focusing on tax evasion in consumption taxation tend to find some tax evasion (Pomeranz 2015, Naritomi 2020 and Harju et al. 2020). Although these studies do not investigate HTC or exactly the same industries as we do here, they emphasize that in the absence of withholding and other procedures in income taxation, there is likely to be some tax evasion by firms. Thus, the result that HTC is not effective in curbing tax evasion seems surprising. Our survey evidence points to rather low levels of tax evasion in the services studied, but nevertheless some tax evasion may exist. The explanation for the effect being minor could instead be that household's consumption decisions are not very responsive to HTC policies and those consumers who buy services from tax-evading firms may not be those who claim HTC.

We contribute to earlier studies on HTC by providing both a comprehensive description of consumption and usage patterns as well as an analysis on the causal effects that HTC has on the consumption of services, which is ultimately crucial information for policy design. Earlier reports have shown that the HTC system is highly regressive (Häkkinen-Skans, 2011; Skatteverket, 2018), and hence increases income inequality. Grönberg and Rauhanen (2015) focus on how HTC affects pensioners. They find the usage of HTC among the elderly is hampered in two ways. First, the elderly may not be able to claim the credit, due to poor health or the complexity of the system. Second, low-income pensioners do not have the income to buy the services in the first place and they do not pay enough taxes to be able to use the full amount of HTC. A recent report by the Swedish National Audit Office focuses on cleaning and the care sector and finds that the tax credit of HTC does not fund itself and meets its target in increasing employment poorly (Riksrevisionen, 2020). The authors use matching to study the labor market status of individuals employed in the sector after the introduction of the credit. The report finds that foreign-born individuals working in the industry producing HTC eligible services had a somewhat better labor

market status than those in the comparison group, whereas for Swedish born individuals there was no effect. However, the matching method suffers from selection issues, and therefore the credibility of the results is hard to evaluate.[1] Nevertheless, in general, these results are also very much in line with our empirical results.

This report continues by describing the relevant institutions in Section 2. Section 3 discusses our empirical approach and theory on the efficiency of HTC policies. Section 4 sets out our descriptive evidence and Section 5 shows our results from the causal analysis. Section 6 discusses the findings and concludes the study.

1 The report also finds that a notable share of newly hired staff in the industry producing HTC eligible services, were labor immigrants from the EU, implying that this positive effect is driven by individuals who were not registered in Sweden before the tax credit. Based on their analysis focusing on the labor supply effects of HTC consumers, the report is pessimistic about HTC being efficient in increasing the labor supply as the majority of HTC claimants are not in groups that increased their labor supply at the time of claiming HTC. The results of the report suggest that the only group that increased its labor supply was families with small children at home. However, again, it is hard to evaluate the credibility of these results and it is likely that selection issues are present in this setting also as, for example, those who start working have higher income, and hence consumed more in HTC services.

2 Institutions

In this Section, we briefly discuss the main institutional details of the household tax credit in Finland and in Sweden. The household tax credit (HTC) allows individuals to deduct part of the labor costs of household work services from the buyer's income tax liability. The deductible household services eligible for the tax credit include renovation, cleaning services and care. Depending on the institution, the buyer claims the credit by herself or the deduction is filed directly at the time of purchase by the seller.

HTC consists of three important parameters. The first parameter is the percentage share of labor costs deductible from income taxes. The labor costs include wage costs, value added taxes (VAT), income tax and payroll costs forming the basis of the deductible tax credit. The second parameter is the maximum annual amount of tax credit, which is set per taxpayer, not per household, in both Finland and Sweden. Thereby, households with multiple taxpayers can deduct higher expenses. Third, a co-payment is deducted from the credited labor costs. For example, if a service costs EUR 1200, of which EUR 1000 consists of labor costs, a 50 percent deduction with a 100-euro co-payment makes EUR 400.

Next we describe the details of HTC and changes over time for Finland and Sweden separately. Some of the changes are important for the study as we use them to draw causal inference.

2.1 Finland

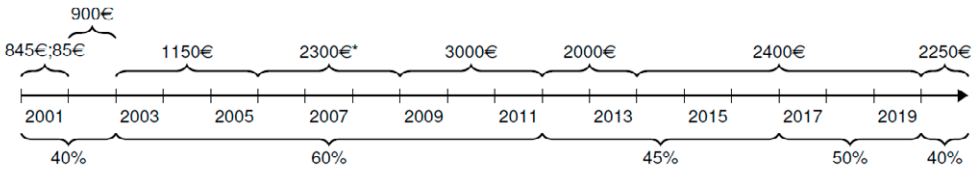
Household tax credit had already been experimented with in Finland in 1997–2000. At the time, the experiment divided Finland into two parts: in half of the country, firms claimed the credit directly, and in the other half individuals claimed it by themselves. Otherwise, the rules of the HTC were the same in the whole country. Due to the administrative costs arising in the system where seller credited the costs directly, the government decided to adopt a nationwide system based on individuals claiming the credit starting in January 2001.

In this system, a taxpayer claims the tax credit by reporting household service purchases to the tax authority. The tax authority then aggregates all the purchases, calculates the HTC the taxpayer is eligible for and finally deducts the credit from the taxpayer's tax

liability. To receive the tax credit, the taxpayer either waits to file her tax return for the current year, which, during our research period, took place late the following year, or alternatively can reduce her withholding of income tax for the rest of the year and thereby benefit from the credit slightly sooner.

In Finland, the parameters governing the generosity of the HTC have changed many times since the adoption of the nationwide system. Figure 1 lists the changes in the parameters on a timeline. In the figure the maximum tax credit is presented above the timeline in the middle and the percentage-share deductible from income taxes is below. The deductible share of labor costs was 60% at the start and decreased to 45% in 2012. In 2017 the deductible share increased from 45% to 50%. The maximum HTC limit was doubled from EUR 1150 to 2300 for cleaning and care services in 2006, but the upper limit for renovation services remained at EUR 1150 until the end of 2008. In 2009, the maximum HTC increased to EUR 3000 for renovation, cleaning and care. In January 2012, the limit was reduced from EUR 3000 to 2000. In 2014, the maximum was increased from EUR 2000 to 2400. The co-payment was originally EUR 85, but was quickly increased to EUR 100 in 2002 without subsequent changes.

Figure 1. Timeline of HTC in Finland



Note: The maximum tax credit (co-payment EUR 100) is given above the timeline and the % share that can be deducted is below the timeline.
*In 2005–2008 the maximum credit for renovation was EUR 1150 and for renovation, cleaning and care combined EUR 2300.

2.2 Sweden

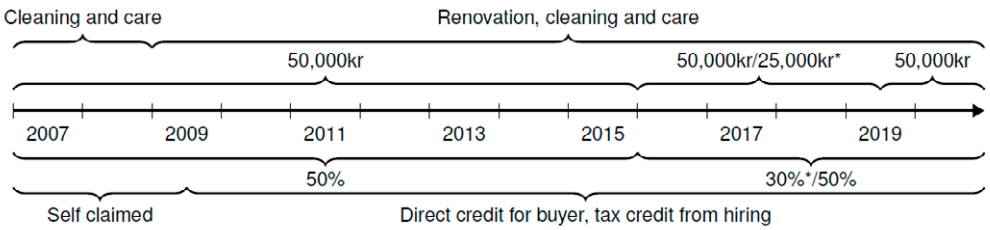
In Sweden, the parameters of HTC have been quite stable after the introduction of the HTC system in 2007. Note that Sweden had already applied similar occasional tax credit tools for renovation services for fiscal purposes before the current HTC system[2].

2 Sweden applied temporary HTC policies for renovation in 1993--1994, 1993--1999 and 2004--2005. It was argued that these temporary policies balanced business cycles.

Figure 2 shows the timeline of the tax credit from 2007 to 2017 in Sweden. The Swedish HTC system has been much more stable over time than the Finnish system, as is visible in Figure 2. The most important changes for this study are the implementation of the system and the change in claiming the credit. Since the adoption of the current HTC system in July 2007 and until 2009, the tax credit was applied only to cleaning and child and elderly care services. Importantly, during this time the credit was claimed by individuals. In July 2009, the HTC system was reformed, with responsibility for claiming being moved from the buyer to the seller of the service. In this so-called invoicing model, the seller charges the HTC part to the tax authority and the tax authority pays the credit directly to the firm based on its invoice. The buyer gets the benefit directly and is only responsible for knowing her eligibility. The tax authority confirms the eligibility only at the end of the year when taxation is finalized the. If it then turns out that the credit was claimed falsely, the credit is charged to the taxpayer in her income taxation. In both systems, it is necessary for the taxpayer to have tax liability so that she can benefit from the credit. In the invoice model it means that if the tax liability is lower than the amount of HTC credited in the invoice, the tax authority claims the HTC back in the same way as tax debt. Also, in 2009, renovation services were included in the HTC.

The maximum deductible amount, the co-payment and the percentage share of the costs were all at the same level from 2007 to 2015. However, the deduction for renovation services – formally applied from 1 July 2009 – was applied to renovation work that had been performed and paid for as of December 8, 2008. In 2017, the Swedish government introduced the following changes to the HTC system: 1) a SEK 25,000 upper limit for cleaning services and care, if the buyer is under 65 years old, 2) the total maximum HTC remained SEK 50,000 (for renovation, cleaning services and care) per individual, and 3) the share of deductible renovation services was reduced from 50% to 30%. We do not utilize these latter changes in the study due to data limitations.

Figure 2. Timeline of HTC in Sweden



Note: The maximum tax credit co-payment in SEK is given above the timeline and the % share that can be deducted is below the timeline is the, SEK 10≈ EUR 1.
* SEK 25,000 upper limit for RUT work (cleaning and care) if the buyer is under 65 years old. Maximum for ROT (renovation) alone or for RUT+ROT is still SEK 50,000. ROT deduction – 30%, RUT deduction – 50%.

3 Empirical approach

3.1 Predictions

The main aim of the HTC systems in Finland and Sweden has been to increase employment in the service sector through increased consumption of household services. Additional arguments for HTC include its potential to decrease tax evasion because credit claims are reported to the tax authority. Moreover, HTC might increase labor supply among households as it could induce households to use household services instead of doing household work themselves and thus release time for paid work. These effects are discussed in more detail below.

Employment in the service sector. The main desired effect of HTC is to increase employment in labor-intensive service sectors. For this to happen, the consumption of household services needs to increase due to HTC. The idea is to lower the consumer prices of services with HTC, and the lower prices would then create more demand for such services. Finally, firms would respond to the increased demand by hiring more employees. As HTC is deducted by consumers, it affects prices unless firms increase the market prices of their services by the amount of the HTC. However, discounting a credit that is received later together with uncertainty of the size of the credit may reduce the perceived value of the HTC to the consumer away from the nominal effect on price. Empirically, we are interested in how sensitive the consumption of household services is with respect to their after-HTC price, i.e. what is the demand elasticity of services. If we were not to detect any increase in the consumption of household services, we would not expect any increase in employment in service sector firms either.

It should be noted that even if there is an increase in employment in sectors producing HTC-eligible services, it could just shift labor from one industry to another, not affecting the level of *aggregate* employment. Therefore, for the tax credit to be effective in creating employment would require new labor to come from outside the labor force or from the unemployed.

Tax evasion. HTC could reduce tax evasion by making previously unreported transactions into reported ones. This is because HTC incentivizes customers to require receipts for their payments so that they can claim the tax credit. To claim the tax credit, the taxpayer is required to report the transaction to the tax authority, effectively creating third-party information for the tax authorities. This may increase compliance by firms because tax enforcement is more efficient. Thus, even if it does not increase the actual demand for

services, HTC can reduce tax evasion by turning shadow economy activity into reported activity.

However, there may also be opposite effects as firms[3] can increase false reporting of labor costs relative to other inputs in the client's bill and households may engage in falsely claiming in a system where households claim the credit.

Labor supply. HTC may increase the labor supply of the buyers of the services. From the perspective of the buyer, the opportunity cost of time changes due to HTC. For example, hiring someone to clean your house will free time to be allocated either to leisure or work. Then, a more generous HTC could potentially increase labor supply of individuals. Note that this mechanism requires that the HTC increases the demand for the services in the first place.

Distributional effects. As HTC is credited against income taxes, low-income individuals might not have enough tax liability to be able to benefit from HTC. Moreover, it could be that higher-income households have more resources to use services against which HTC can be claimed than lower-income households have. Thus, based on the institutional details HTC is a regressive system, i.e. it benefits higher-income individuals more than lower-income individuals. It remains an empirical question how regressive it effectively is.

For the HTC to create employment, it first needs to increase consumption of household services. Therefore, we focus on this margin in the empirical analysis by looking at whether the value of reported sales increases among firms producing such services. The value of reported sales is also informative about changes in tax evasion. We view the impact on the number of transactions and reported sales as measures of the efficiency costs created by HTC. We also analyze the distributional aspects of HTC, as optimal policy is a balance between efficiency costs and the distributional effects of the policy.

3.2 Data

Our main data come from the Finnish and Swedish Tax Administrations. These include firms in industries providing services qualifying for HTC, mostly cleaning and repair services.

3 Or firms and clients can collude to report more labor costs. Doerr and Necker (2020) studied collaborative evasion in a setting with an online experiment and found some evidence of collaborative evasion when the consumer signals willingness to collude. In most estimates, the difference between the evasion price and the official price is not profitable for the consumer in terms of the foregone tax credit. However, when restricted to an anonymous market, the proposed evasion discount is higher than the subsidy (20%).

These industries are selected for our data based on the extent to which HTC is used in different industries. We include the two-digit industry codes 41 and 43 for renovation and the five-digit codes 81210 and 81100 for cleaning. In our empirical analysis of the impact of HTC on consumption, we mainly use firm-level data from firms' VAT reports. These data include information on the amount of VAT firms remit monthly, quarterly or annually, and similarly the amount of VAT-deductible inputs claimed. These data are available from January 2006 to December 2014. The VAT report data are informative about how the value of reported sales develops when the HTC rules are changed. With additional data on prices one can also separate out the changes in the quantities of services sold as the value of sales is a product of prices and quantities.

In addition, we have annual-level tax declarations by firms. These data include annual labor costs, other input costs and taxable profits. We describe the firm-level data, the usage of the HTC and the trends in the HTC sectors in detail in Section 4.

On top of the firm-level data, we also exploit various other data sources. We have individual-level data on individuals who claim HTC from 2006 to 2014. We also use industry-level data from Eurostat to show the overall development of industries across countries and over time to show macro-level changes. In addition, to study how HTC is used across the income distribution, we use Income Distribution Statistics, which are a representative sample of Finnish taxpayers maintained by Statistics Finland. The income distribution statistics describe the distribution of the annual income of households and income differentials between different population groups. We also use the SISU microsimulation model to study to what extent HTC is used in different parts of the income distribution. Finally, we have consumer price index data to show how consumer prices develop over time in general but also in different sectors before and after changes in the HTC system.

We also conducted a survey in Finland in spring 2020 on the usage of household services and HTC among a representative sample of working-age individuals. We report the results of the survey in the next section.

3.3 Methods

We described above the rich information we had available on various aspects of household services and HTC. We describe this over time and focus on time periods when the HTC rules changed.

To study how HTC affects the consumption of services, we apply a difference-in-differences (DiD) approach. We analyze cleaning and repair services separately with

different designs. In analyzing cleaning services, we utilize the implementation of HTC in Sweden and the 2009 change in the claiming system in Sweden. In Finland, HTC was already in place for cleaning services and no changes were made to the policy, so we use Finland as a control group to see how the consumption of cleaning services by Swedish households would have developed in the absence of the introduction of HTC. The identification requirement in this approach is that consumption trends in the absence of policy changes are parallel. We believe these countries are comparable as, for example, their institutions, geography, culture, climate and seasonal vacation periods are similar. We can test the parallel trends assumption by looking at consumption trends in cleaning services before the implementation of the policy in Sweden in 2007.

We study the responses by estimating the following equation.

$$y_{it} = \beta_0 + \beta_1 \times Treat_i \times Post_1 + \beta_2 \times Treat_i \times Post_2 + M_t + \mu_i + \varepsilon_{it} \qquad \text{Eq. 1}$$

where y_{it} is the outcome of interest (in logs) for a given firm i at time t. $Treat_i$ is a binary variable with the value 1 for Swedish firms in the cleaning sector and zero for Finnish firms, $Post_1$ is a binary variable with the value 1 after the introduction of HTC for cleaning services in Sweden post January 2007, $Post_2$ is a binary variable denoting the reform of 2009, μ_i captures the firm fixed effects, M_t captures the month (or year) fixed effects and ε_{it} is an error term. Our main outcomes of interest are monthly-level sales and inputs from firms' VAT reports. We also use annual-level measures such as labor costs and taxable profits to study firm-level responses. All these outcomes are in logarithmic values.

As noted above, the main identifying assumption in the DiD method is parallel trends in the outcome of interest between the treatment and control groups. There are two potential concerns in our empirical setting. First, different macroeconomic trends between Sweden and Finland might invalidate the use of the DiD setting. In Section 4.3 we present evidence suggesting that the macroeconomic conditions do not invalidate the use of DiD for the cleaning industry. Second, firms in these industries could develop differently over time in the two countries. Therefore, it is important to validate the comparison between the countries in the time before the reform, also using firm data. This is what we do in Section 5, where we explicitly show that the pre-reform trends for the control and treatment groups are parallel, suggesting that this identification challenge does not apply in our setting. Third, it is important that these industries do not face any other changes in their incentives in the time period we focus on. We are not aware of any policies affecting the cleaning or renovation sectors during our examination period.

Second, we study the effects of a large increase in the maximum level of annual tax credits for renovation services in Finland in January 2009. In this analysis we again utilize the DiD method, but here we compare firms in the Finnish renovation sector to other Finnish

firms in similar sectors unaffected by this reform. We do not apply a between-country DiD method as the renovation sector does not develop similarly in Finland and Sweden due to the very different macroeconomic impact of the financial crisis in the renovation industry at the time of the policy change.

We instead take an alternative approach and use coarsened exact matching (CEM) to select a control group among firms in other sectors in Finland. We first select firms in the renovation industry to form the treatment group. These include industries providing construction or building renovation services, flooring, roofing, installation work etc. The industry codes included in the treatment group are listed in more detail in Table 10 in the appendix. The control industries are matched from industries that are not included in the treatment group and otherwise do not provide services eligible for HTC. Otherwise the list of industries from which the control group is formed by matching resembles the treatment group industries, for example in terms of size and type of business activity. Hence, we chose car retail and repair and logistics as our control industries, listed in more detail in Table 11 in the Appendix. We then use a CEM matching algorithm to select firms into the control and treatment groups. The idea of the method is to use an algorithm to pick suitable control firms from the control industries based on pre-reform information. We then give them weights to match them to the treatment group. The variables we use in the matching are pre-reform annual sales, sales growth and annual labor costs immediately before the reform.

In the DiD analysis, we estimate equation 2 below, where $Post_1$ is a binary variable with the value 1 after the increase in the maximum amount of annual credit in January 2009, and $Treat_i$ is an indicator with the value 1 for firms in the renovation industry and zero for the control group firms.

$$y_{it} = \beta_0 + \beta_1 \times Treat_i \times Post_1 + M_t + \mu_i + \varepsilon_{it} \qquad \text{Eq. 2}$$

The outcome variables are the same as for the cleaning sector: monthly-level sales and inputs from firms' VAT reports, annual-level labor costs and taxable profits. All these outcomes are turned into logarithmic values to give us relative effects and to avoid outliers driving the results.

4 Descriptive analysis

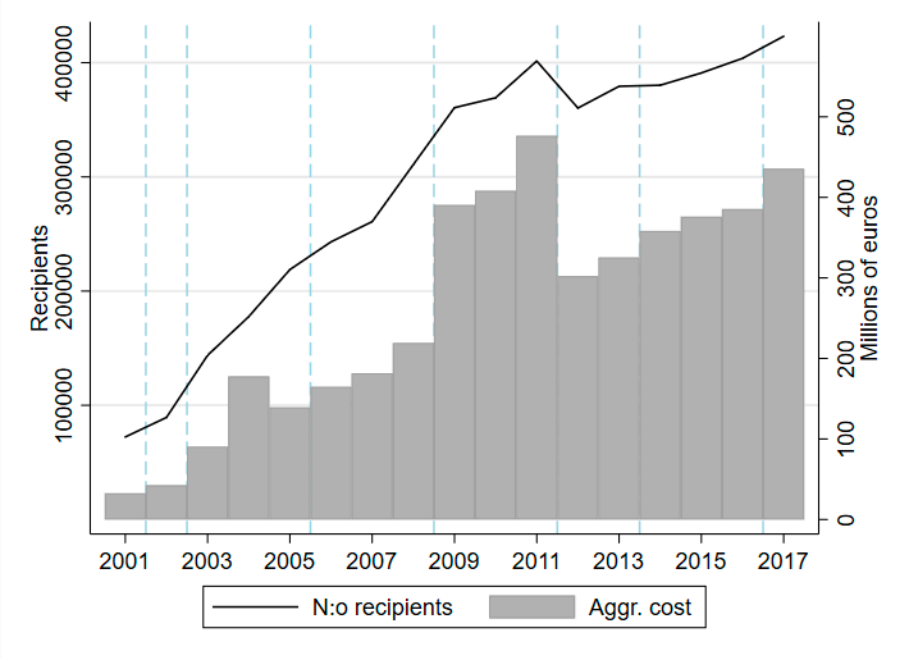
In this Section, we first describe the overall use of HTC in Finland and Sweden over time. We do this both by showing evidence of individuals claiming deductions and firms operating in sectors providing HTC services. We also present our survey evidence on the consumption of services and usage of HTC in this section. Moreover, we describe the macroeconomic conditions in Finland and Sweden that are essential to consider in our empirical approach for cleaning services. Finally, we show evidence of the comparability of firms between the countries before and after the reforms of the HTC rules.

4.1 Consumers

We begin the descriptive analysis by describing data on HTC claims in Finland. Figure 3 shows the number of HTC recipients (left axis) and the sum of HTC claimed in euros in Finland from 2001 to 2017. The number of recipients has increased over time with a small dip in 2012 when the government cut the level of maximum tax credit from EUR 3000 to 2000. In 2017, over 400,000 taxpayers in Finland claimed HTC. The sum of claimed tax credits (right axis) has also increased substantially from the early years of HTC adoption to over EUR 400 million in 2017. The aggregate costs of the system to the public sector in 2009–2011 clearly stand out from the figure but are not surprising as in those years the maximum HTC was at its highest level, EUR 3000. After the decrease in the maximum tax credit and the share of the credited share of labor costs, there is a small dip in the number of HTC claimants, but note that this drop is very small. Note that an increase in the aggregate cost does not imply an increase in the consumption of household services due to the credit rather than higher credit claims due to a more generous system. We will analyze the impact question in the next section.

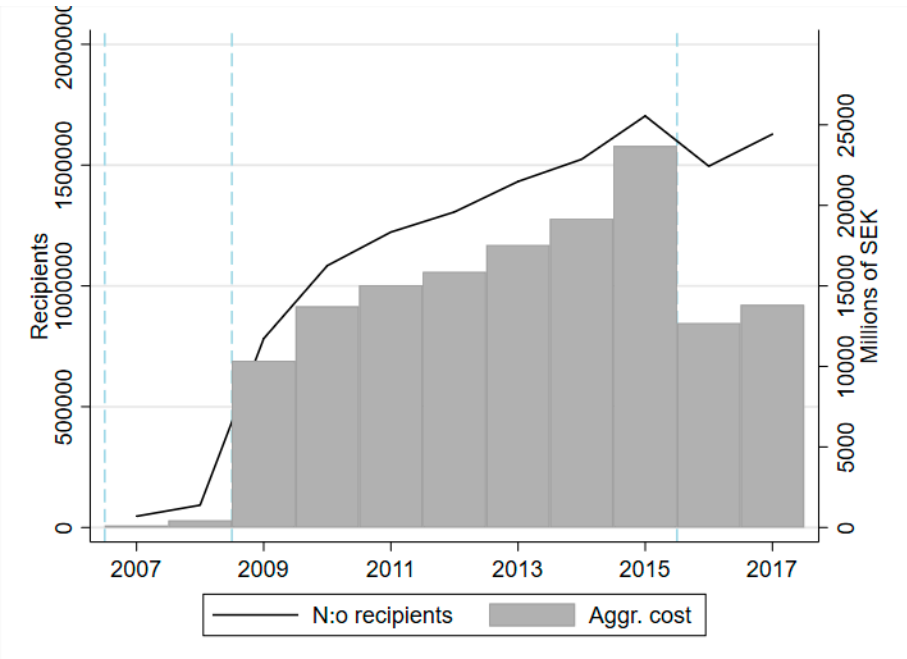
Figure 4 below paints a similar picture for Sweden. Initially the number of individuals claiming HTC is modest but increases rapidly when renovation was included in the scheme and the system changed to an invoice system in 2009. Also, the aggregate value of claimed HTC increases sharply, with a peak in 2015, when the amount of claimed HTC is over SEK 2 billion. From the beginning of 2016 the Swedish government reduced the maximum annual tax credit substantially, and this decreased the aggregate value of tax credit sharply to less than SEK 1.5 billion.

Figure 3. Household tax credit usage in Finland 2001–2017



Note: The black line and the left scale denote the number of consumers claiming the credit. The bar plot and the right vertical axis denote the aggregate sum of granted HTC. Euros are in nominal values. Vertical lines denote changes in the HTC system. Source: Statistics Finland.

Figure 4. Household tax credit usage in Sweden 2007–2017



Note: The black line and the left scale denote the number of consumers claiming the credit and the bar plot on the right vertical axis denotes the aggregate sum of granted HTC. SEKs are in nominal values. Vertical lines denote changes in the HTC system. Source: Statistics Sweden.

Table 1 describes the features of individuals receiving HTC in Finland. More taxpayers have received the tax credit over time; hence, we are not only interested in the characteristics of an average HTC claimant, but also how these have changed over time. The table shows summary statistics for HTC claimants in 2006, 2011 and 2014. Men and women are as likely to claim HTC[4]. However, a notable common feature of HTC claimants is their relatively high age. The average age of HTC claimants seems to have increased in the past decade. Related to age, a noteworthy feature of HTC claimants is the high share of pensioners. The fact that HTC claimants are older than average taxpayers is somewhat anticipated. This is because older taxpayers tend to have higher income, at least up to a point. Moreover, using renovation services is more likely when owning property, such as a house, second home or summer cottage, the likelihood of which increases with age. Finally, care services are more likely to be consumed by individuals needing help to live at home in older age. However, care services make up a small proportion of HTC claims.

Table 1 also shows that mean and median HTC claimants have a notably higher taxable income than the average Finnish taxpayer. While the average income of a Finnish taxpayer was EUR 25,852 in 2010, the average income of an individual receiving HTC was EUR 47,750. The summary statistics also show that HTC recipients have relatively high capital income and dividends, the average being around EUR 10,000 a year.

Finally, Table 1 shows that the average HTC and the number of HTC claimants have been increasing over time. Moreover, there is some persistence in the claimant group as approximately 45% of HTC claimants also claimed HTC the previous year.

4 The fact that females are slightly more represented among HTC claimants can be related to the high average age of HTC claimants and the higher life expectancy of women.

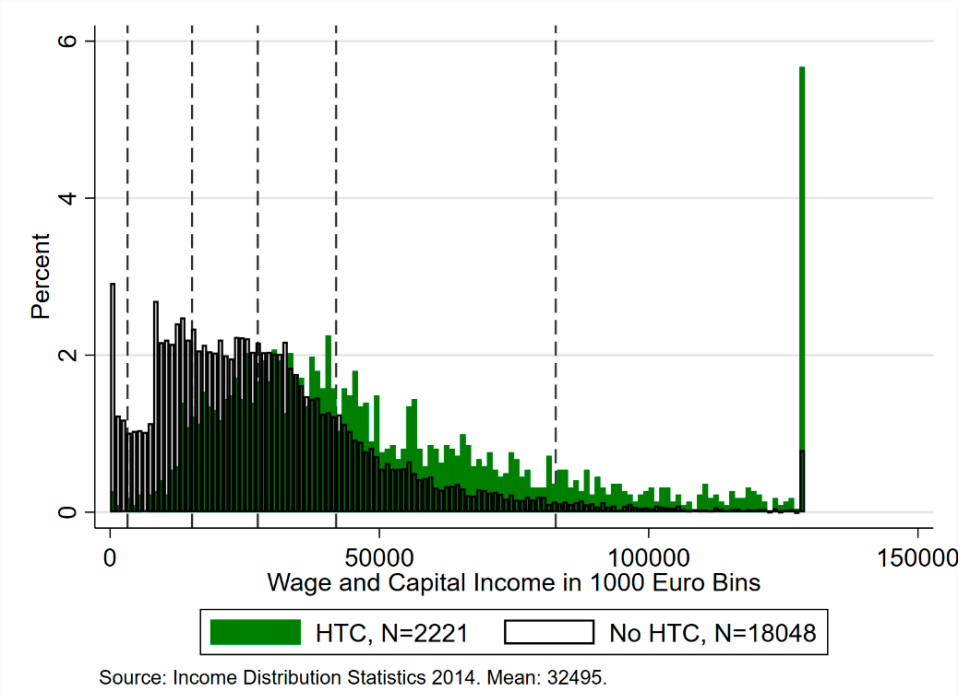
Table 1. Summary statistics of HTC claimants in Finland in 2006, 2010 and 2014

	2006			2010			2014		
	mean	sd	p50	mean	sd	p50	mean	sd	p50
Female	50.6%			51.3%			50.8%		
Pensioner	35.6%			39.5%			45.4%		
Age	53.55	15.77	53	55.25	16.05	55	57.88	16.14	58
Taxable income	45914	160083	30620	47750	134565	33954	52375	159556	36373
Wage etc.	28373	60636	23738	29334	42488	24990	29397	45665	18649
Pension	7073	13378	0	9075	15959	0	11896	18926	0
Capital income	7226	111326	18	5598	74058	0	7257	109454	25
Dividends etc.	3242	50224	10	3744	63018	10	3825	57163	10
HTC	769	569	704	1088	996	717	905	816	625
HTC renovation	484	463	333	856	1015	368	715	837	306
HTC cleaning	254	556	0	197	457	0	155	369	0
HTC care	29	231	0	28	241	0	22	192	0
Received HTC previous year				43.6%			45.6%		
Observations	**241999**			**374530**			**347678**		

Note: This table describes the characteristics of an average HTC claimant. An individual is considered a pensioner if she received pension income that year, so this may include individuals who retired that year or receive a partial pension. The monetary values are in nominal terms. For comparison, the average (median) taxable income of a Finnish taxpayer was EUR 22,896 (18,596) in 2006, EUR 25,852 (21,311) in 2010 and EUR 28,800 (23,805) in 2014 (StatFin, 2020).

Figure 5 illustrates the income distribution of HTC recipients in a different manner. The figure plots the income distribution of HTC recipients and non-recipients according to the Income Distribution Statistics of 2014. The horizontal axis denotes income in 1000-euro bins and the vertical axis the percentage of taxpayers in each bin. The figure tells the same story as the summary statistics. HTC recipients, depicted as green bars, have clearly higher income than non-recipients (hollow bars), implying that the tax credit is directed at the upper end of the income distribution.

Figure 5. Income distribution of HTC recipients and other taxpayers



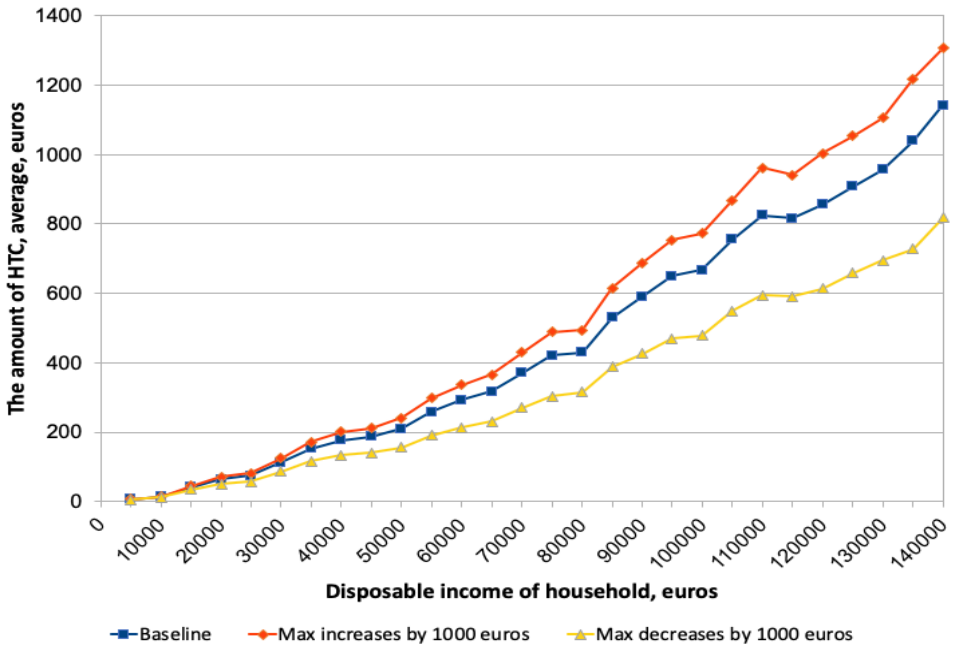
Note: This figure plots the income distribution of HTC recipients in the Income Distribution Statistics of 2014. Income Distribution Statistics are a representative sample of Finnish taxpayers maintained by Statistics Finland. The vertical axis denotes the percentage of taxpayers in each 1000-euro income-bin. The distribution is winsorized at the 1 percent level at each end. The dashed vertical lines depict the 5th, 25th 50th 75th and 95th income percentile.

Figure 6 shows even more clearly how HTC claims increase with household income. The figure shows eligibility for HTC by household income simulated with the SISU microsimulation model and based on extensive representative administrative data on Finnish taxpayers and their HTC claims as part of their tax declarations. The figure shows that poorer households benefit only very little from HTC and the amount of HTC that households claim on average increases steadily with household disposable income. This demonstrates quite clearly the regressive nature of HTC, meaning that, relative to income, higher-income households benefit more from HTC than lower-income households.

The figure also shows two reform scenarios, one where the maximum HTC amount is increased by EUR 1000 and one where the maximum is decreased by EUR 1000. The reforms have a fairly monotonic effect on the average usage of HTC by household income in the simulations. This means that those who use HTC more in the baseline would use it even more if the maximum amount had increased, and vice versa. The simulations are static and do not attempt to anticipate how the consumption of services or credit claims would change in response to changes in policy. The simulation is based on the amount of household services that individuals report when making their credit claims. The effect is asymmetric in the sense that increasing HTC would have a smaller effect than decreasing

HTC by the same amount in the simulation, but this is likely driven by individuals not claiming the full amount of services in the data after they have exhausted the full amount of benefits, and thus we would expect the actual effect to be more symmetric than the simulation shows. We do not show here a simulation where the percentage of labor costs that the HTC replaces is changed, because the results are qualitatively quite similar to those shown here.

Figure 6. Simulated amount of HTC eligible for by household income and two reform scenarios



Note: The blue line plot shows the average HTC eligibility in different income levels simulated with SISU microsimulation model in the baseline, which is year 2018 data and rules (maximum HTC amount is 2400 eur per individual). The horizontal axis denotes the income level and the vertical axis the average amount of HTC. The orange line plots the simulated average amount of HTC in each income category if the maximum credit was to increase by 1000 euros. The yellow line plots the simulated average amount of HTC in each income category if the maximum credit was to decrease by 1000 euros.

Figure 7 describes the distribution of spending on the labor cost part of services on which HTC eligibility is based in the left panel and the distribution of the amount of HTC received by individuals in the right panel. In the years 2009–2011 the maximum amount of HTC was EUR 3000. To receive the full credit the buyer would need to record labor costs of EUR 5166.66[5]. In Finland taxpayers report labor costs conferring eligibility for HTC in their tax returns and the tax authority uses these to calculate the amount of the tax credit. The left panel of Figure 6 shows that in most cases the labor costs for services are relatively small,

5 5166.66·0.6-100≈3000

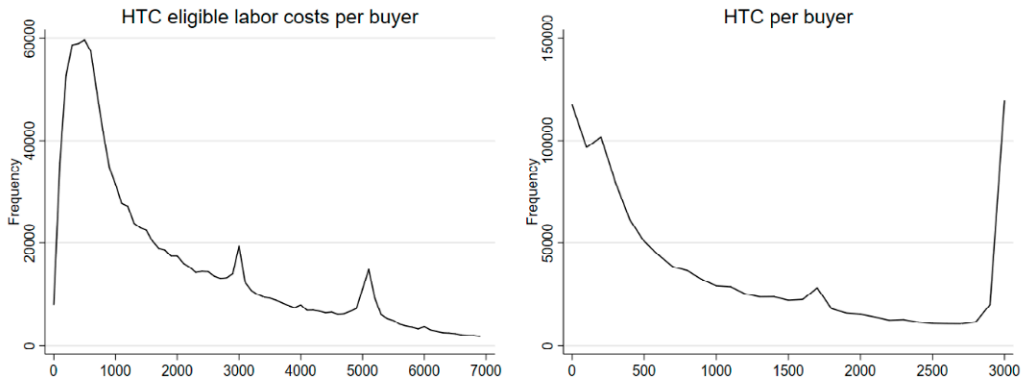
but with curious spikes. The spikes are called excess mass or bunching, and one place exhibiting bunching is at the value of the maximum allowed labor costs conferring the full amount of credit. Some of this bunching may be due to consumers not bothering to report the services they used after exhausting the full amount of the credit.

However, there is also clear bunching at a lower value of labor costs, which happens to equal exactly the amount of the maximum tax credit. There should be no service value or HTC-related reason why we should expect reported labor costs to display excess mass at this value. The value of EUR 3000 is mentioned in the guidelines describing the HTC system: it is the maximum credit amount, but not any particular value when reporting labor costs to which the credit amount is linked through a formula. Thus, the bunching at this value suggests that many individuals have made a mistake and reported the maximum credit amount when they should have reported the amount of labor costs providing entitlement to the maximum credit amount. It is a costly mistake, too. If a buyer reports this amount of purchased labor costs, she receives only EUR 1700 in tax credit in the years 2009—2011 instead of the EUR 3000 she might have been eligible for.

In Figure 8, we compare the excess masses at each bunching region to a counterfactual distribution with a bunching method (see e.g. Kleven, 2016). This allows us to calculate the magnitude of the excess mass. The counterfactual density is estimated by fitting a seventh-degree polynomial to the distribution when excluding the bunching region. We find an excess mass of 1 at EUR 3000. This indicates that the number of taxpayers, around 24,000 taxpayers, is twice as high as in the surrounding distribution, where around 12,000 taxpayers reported purchases of approximately EUR 3000 in 2009-2011. The right-hand graph shows that the excess mass estimate near the maximum HTC value is almost 2.9 times the counterfactual.

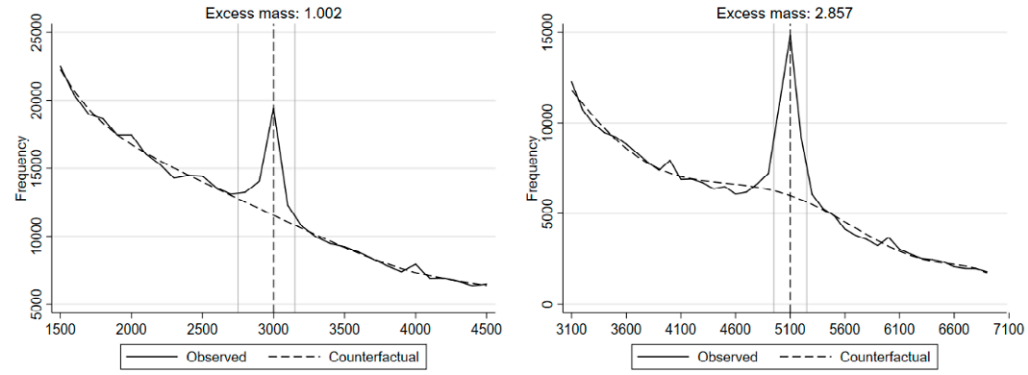
Figures 32 to 35 in the Appendix show a similar analysis for different HTC regimes. This is done mainly to check that there was no other reason for the excess mass exactly at EUR 3000 of labor costs than that the claimants had made a mistake. In these other regimes the maximum amounts of HTC are EUR 2400 and 2000. We find significant excess mass at these amounts to the same extent as above. Observing that the bunching moves together with this wrong parameter further suggests that the excess mass arises due to a mistake. Moreover, the extent of bunching has stayed quite high over time, suggesting that misperceptions of the system have persisted.

Figure 7. Distribution of HTC claims in 2009–2011



Note: The left figure plots the distribution of HTC claims as HTC-eligible labor costs as a share of total claims (including all services consumed that year) in 2009–2011, when the maximum credit was EUR 3000 and the minimum labor costs to receive that amount were EUR 5166.66. The horizontal line depicts the amount of labor costs in claims and the vertical line the number of taxpayers within each 100-euro bin. The right figure plots the distribution of granted household tax credits with the size of the HTC on horizontal line and the number of taxpayers within each 100-euro bin on the vertical line.

Figure 8. Frequency of HTC claims in 2009–2011



Note: The left figure depicts bunching at EUR 3000 of labor costs and the right figure bunching at EUR 5166.66. In order to claim the full credit, labor costs should be at least EUR 5166.66. The excess mass estimate is calculated in comparison to the counterfactual distribution, which is estimated as a seventh-degree polynomial excluding the bunching regions denoted by the grey vertical lines. The estimated excess mass allows the comparison of different bunching regions but should not be interpreted as an elasticity.

Features of the HTC user data lead to some interesting observations. First, the high average age of HTC claimants and number of pensioners limits the effectiveness of HTC in increasing the labor supply, contrary to some recent discussions (Kurronen, 2020)[6].

6 This is in line with a finding in Riksrevisionen (2020) for Sweden.

Moreover, the vast majority of HTC claims concern renovation services, which seem even less likely substitutes for paid work as many of these require some professional knowledge unlikely to be possessed by most taxpayers[7].

Second, HTC accrues to high-income individuals. The mean income of an HTC recipient is approximately double that of an average taxpayer. The average amount of HTC claimed clearly increases with household income, as shown in this section. This means that HTC is a highly regressive tax credit. Also, the HTC system is quite expensive for the public sector at an annual cost of more than EUR 400 million in Finland. Therefore, based on this descriptive analysis HTC increases income inequality but this effect can be balanced out if we find that employment increases among lower-income workers.

Third, the distributional analysis reveals that thousands of people each year make a mistake and claim a lower amount than they would presumably be eligible for. The bunching of several thousand individuals at the wrong values represents the only observations we could identify as mistakes, but there are likely many more mistakes we could not identify. This suggests that some features and details of the system are not fully salient to claimants and that there are clear information concerns related to the HTC system. This in turn is also likely to reduce the ability of the system to achieve its supposed goals of creating more consumption of household services as consumers do not fully understand the details of the system.

4.2 Survey

Although the main body of this report uses administrative data to study the effects of HTC, there are some questions that are not easily answered with such data. For this reason, we conducted a survey on HTC. This included questions such as to what extent do households typically consume household services, knowledge of the HTC rules, the extent of tax evasion and how people perceive they would react to changes in HTC. The survey was conducted on a random sample of the working-age population in Finland in the spring of 2020.

The main results of the survey are that the usage of both HTC-eligible services and HTC itself are not very common in the working-age population, the details of HTC are not well known by the general public, reported tax avoidance is uncommon, and that the Covid-19 pandemic reduced service purchases substantially in spring 2020.

7 E.g. Housing corporations require that plumbing or electricial work is done by a qualified expert.

4.2.1 Survey data and representativeness

The survey was conducted by phone by Taloustutkimus Oy from 2 April to 27 April 2020. 800 working-age (aged 25 to 65) people in Finland (excl. Åland) were surveyed on six main categories of questions:

1. Purchases of HTC-eligible services
2. Usage of HTC
3. Knowledge of HTC details
4. Demand responses to changes in HTC
5. Tax evasion in service purchases
6. Effects of Covid-19 on service purchases

The questionnaire (in Finnish) is provided in the Appendix. The questions are presented in English in Section 1.2. In addition to the survey responses, demographic data on the respondents were retrieved from the Finnish Population Information System.

One of the main drawbacks of using surveys to collect data is that the sample may not be representative of the population under study. One way to test the extent of non-representativeness is to check how well the background variables of the survey respondents match those of the whole population. For this, we use distributions of three background variables – age, gender and region (NUTS 2) – in the survey sample to test whether they differ from those of the whole working-age Finnish population outside Åland. Tables 2 to 4 show that these three background variables are distributed similarly in the sample and study populations. This is also corroborated by Pearson's chi-squared tests for each variable, as reported in the same tables. This suggests that the sample is likely to be representative of the study population and therefore we do not use any weighting scheme in analyzing the survey responses.

Table 2. Gender distribution in the sample and in the total population

Gender	Sample	Population
Female	396 (49.5%)	1,414,716 (49.3%)
Male	404 (50.5%)	1,454,127 (50.7%)
Total	**800 (100%)**	**2,868,843 (100%)**
Pearson chi2(1) = 0.0112, p = 0.916		

Table 3. Age distribution in the sample and in the total population

Age	Sample	Population
25-34	193 (24.1%)	792,910 (24.5%)
35-49	281 (35.1%)	1,015,929 (35,4%)
50-65	326 (40.8%)	1,150,004 (40.1%)
Total	**800 (100%)**	**2,868,843 (100%)**
Pearson chi2(2) = 0.1529, p = 0.926		

Table 4. Regional distribution in the sample and in the total population

Region	Sample	Population
Helsinki-Uusimaa	260 (32.5%)	945,398 (33.0%)
Southern Finland	165 (20.6%)	586,378 (20.4%)
Western Finland	195 (24.4%)	697,421 (24.3%)
Northern and Eastern Finland	180 (22.5%)	639,646 (22.3%)
Total	**800 (100%)**	**2,868,843 (100%)**
Pearson chi2(3) = 0.0797, p = 0.994		

4.2.2 Survey results

In this section, we describe the results of the survey and discuss their implications separately for each topic in the survey.

4.2.2.1 Service purchases and HTC usage

The first two questions of the survey are on service purchases made and the HTC applied for by the respondent. The questions are provided below.

- **Question 1:** How many euros have you spent on the following services in the last 12 months? Renovation services? Cleaning/housekeeping services? Nursing/care services?

- **Question 2:** For the service purchases you mentioned above, what euro amount of HTC have you applied for or will you apply for? Renovation services? Cleaning/housekeeping services? Nursing/care services?

Figure 9 summarizes the number of respondents who said that they purchased such services (purchases) and the number who applied for or were going to apply for HTC for those purchases (claims). The vast majority (562 out of 800 respondents) had not purchased any services over the past year. Moreover, renovation services are the most widely used service in the sample with 173 buyers, followed by cleaning and housekeeping with 85 buyers. Nursing and care services are the least used service with only 12 buyers. Analyses of age group differences in service and HTC usage are given in the Appendix.

We can also see from Figure 9 that while 81% (140/173) of those who have purchased renovation services had claimed or would claim HTC for their purchases, the same was true for 67% (57/85) of those purchasing cleaning and housekeeping and for only 25% (4/12) of those purchasing nursing and care services. There are multiple plausible explanations for these differences in HTC usage rates. It could be simply be that the amounts spent on cleaning and care services are smaller in value and people do not find it worthwhile to apply for HTC for such small amounts, either because they would not be eligible for any HTC or because the hassle of applying is perceived to be too large. Indeed, as shown in Table 5, which provides summary statistics for the reported values of purchases and claims, the mean values of cleaning and care purchases (EUR 1109 and 2329, respectively) are much smaller than the mean value of renovation purchases (EUR 7375). However, it is still possible that the differences in HTC application rates reflect other factors as well, such as differences between the buyers of different services or differences in the prevalence of tax evasion in different service markets.

Figure 9. Service purchases and tax credit claims

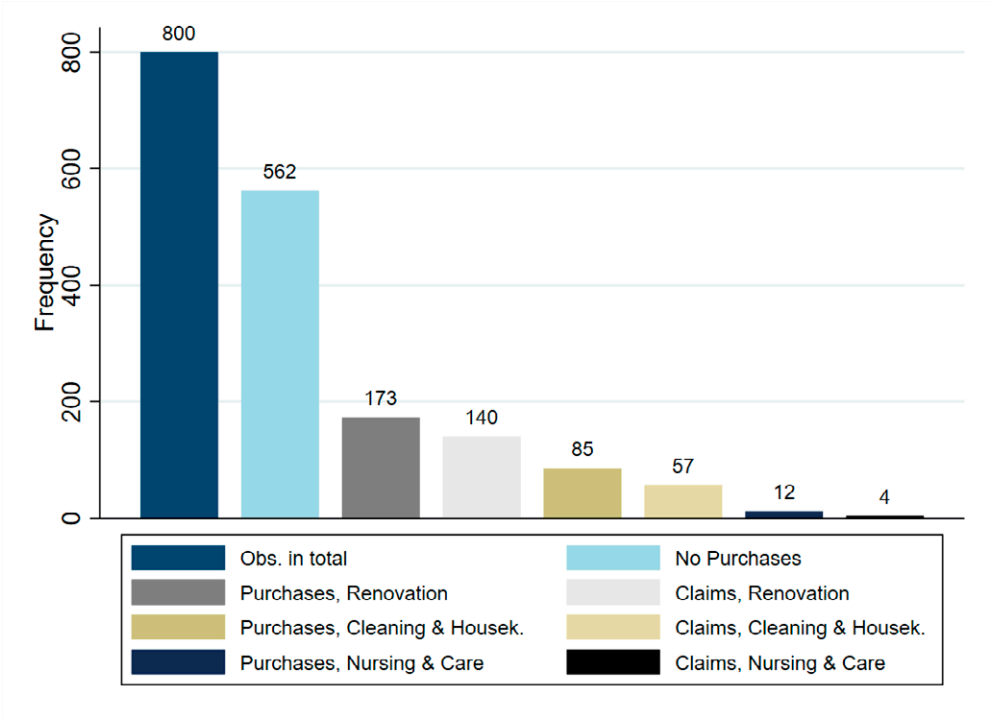


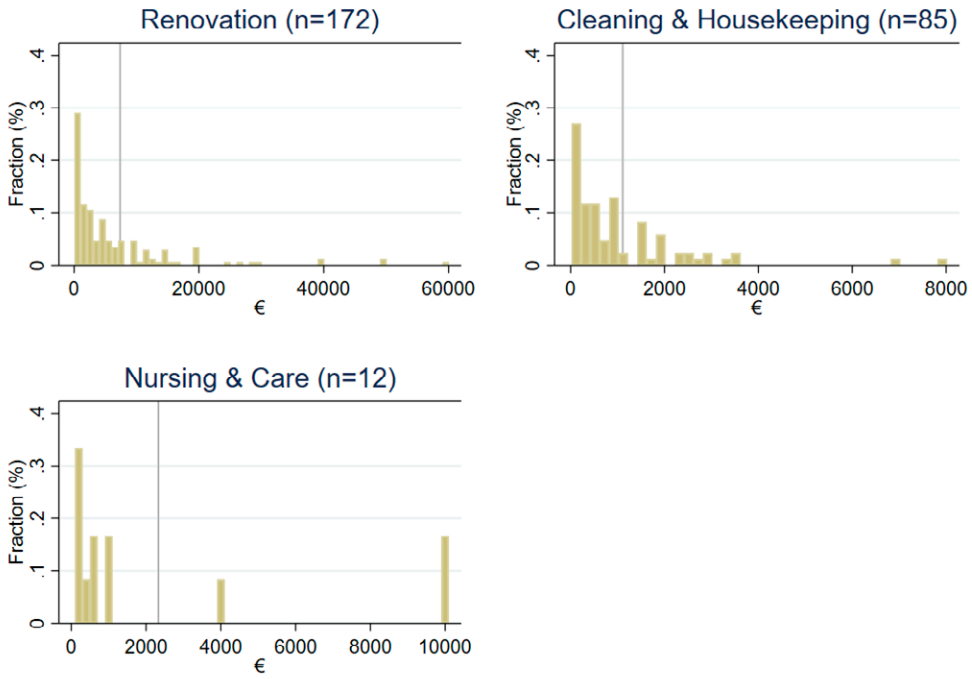
Table 5. Table 5: Service purchases and HTC usage in euros, summary statistics

	N	mean	sd	p50	min	max
Renovation purchases	173	7,375	13,856	3000	50	140,000
Renovation claims	140	3,915	6,607	2100	100	50,000
Cleaning & housekeeping purchases	85	1,109	1,351	600	20	8,000
Cleaning & housekeeping claims	57	1,205	1,193	800	75	7,000
Nursing & care purchases	12	2,329	3,737	500	100	10,000
Nursing & care claims	4	2,800	2,688	2,500	200	6,000

Note: Excluding respondents with no purchases in the service category

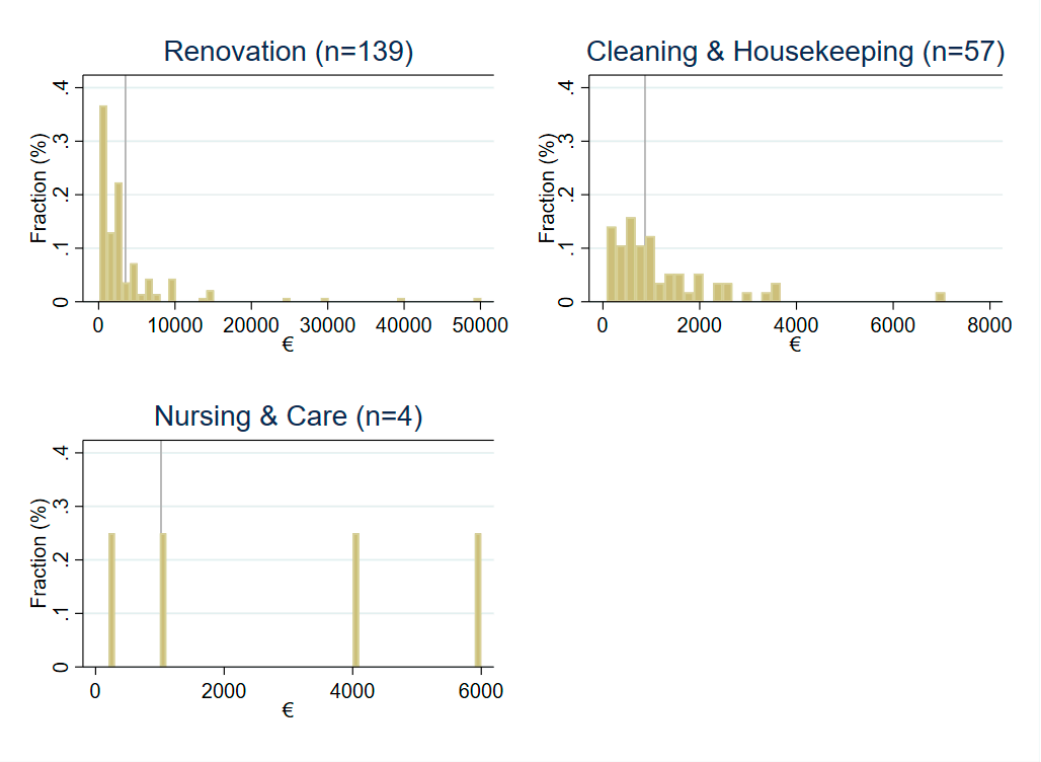
Figures 10 and 11 below show the distributions of service purchases and HTC usage by service type. All the distributions are skewed to the right, so that the majority of both the amounts spent on services and HTC claims are below the mean of the distribution. Hence, most of the sums involved are relatively small, but there are a few large purchase and claim sums.

Figure 10. Service purchases in euros



Note: Vertical lines indicate distribution means. Only respondents with positive purchases are included. One outlier excluded in renovation

Figure 11. Tax credit claims in euros



Note: Vertical lines indicate distribution means. Only respondents with positive purchases are included. One outlier excluded in renovation

4.2.2.2 Knowledge of HTC details

The second set of questions concerns the respondents' knowledge of the HTC tax credit rate, the maximum HTC allowance, the ability to calculate the amount of HTC and knowledge of the credit threshold. The questions are given below:

- **Question 3A**: What is the credit rate of the HTC when you are paying a company for work? Answer in percent.
- **Question 3B**: What is the maximum euro amount one could receive in HTC in a year? Answer in euros.
- **Question 3C**: How much HTC do you think you could receive if you had your bathroom redone for EUR 4000, consisting of EUR 1000 worth of work and EUR 3000 worth of materials? The tax credit rate is 40%. Give your best estimate.

The correct answers to these questions are as follows: Question 3A: 40% (50% in 2019), Question 3B: EUR 2250 (EUR 2400 in 2019), and Question 3C: EUR 300. Note that to arrive at the correct answer in Question 3C one must be aware of the credit threshold, which is EUR 100.

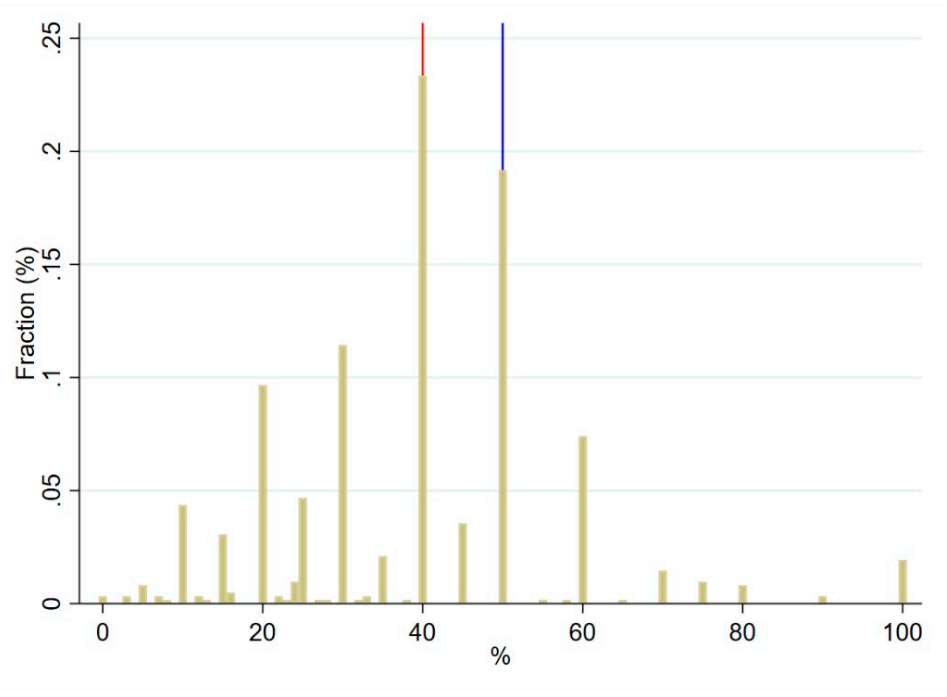
Table 6 below provides summary statistics of the responses to these questions and Figures 12, 13 and 14 plot the distributions of the answers to questions 3A, 3B and 3C respectively. Interestingly, the answers for the tax credit rate and the maximum allowance are close to the right answers in median terms, but there seems to be a lot of variation, indicating relatively poor knowledge of the rules. There seems to be less variation in the example problem, but the median answer corresponds to the right answer when the tax credit threshold is left out. This would indicate that many of the respondents are able to do simple percentage calculations, but their knowledge of the HTC system may be limited. Moreover, many of the respondents in the sample (186.5 on average per question) replied that they do not know, further suggesting that the details of HTC are not well known to the general public.

Table 6. Knowledge of HTC details, summary statistics

	N	mean	sd	p50	min	max
Tax credit rate (Question 3A)	621	38.88	17.93	40	0	100
Maximum allowance (Question 3B)	670	3,893	6,597	2500	0	100,000
Example problem (Question 3C)	736	593	515.7	400	0	4,000

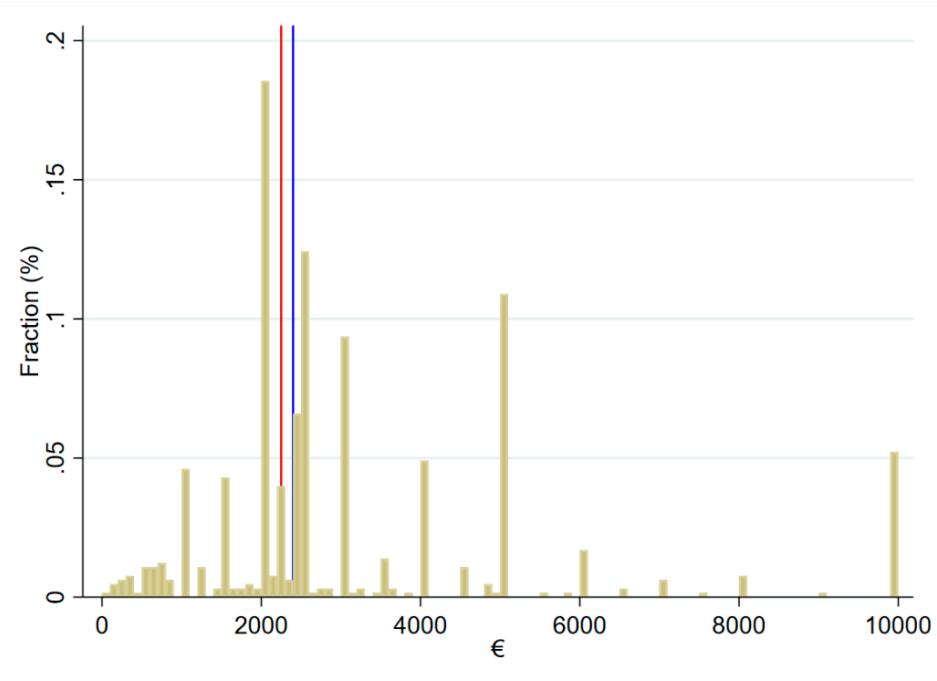
Correct answers: tax credit rate 40% (50% in 2019), maximum allowance EUR 2250 (EUR 2400 in 2019), example problem EUR 300

Figure 12. Knowledge of HTC details, tax credit rate



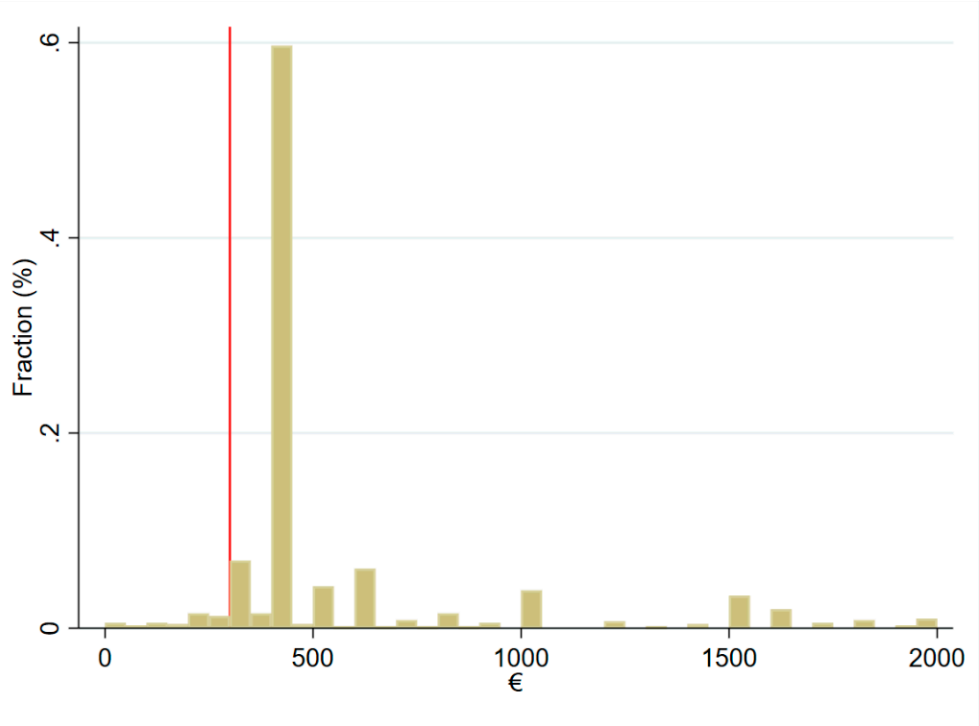
Note: Red vertical line indicates correct answer. Blue vertical line indicates correct answer in 2019. N=621.

Figure 13. Knowledge of HTC details, maximum allowance



Note: Red vertical line indicates correct answer. Blue vertical line indicates correct answer in 2019. 18 outliers excluded. N=652.

Figure 14. Knowledge of HTC details, example problem



Note: Red vertical line indicates correct answer. 14 outliers excluded. N=722.

However, as many of the respondents replied that they had not purchased HTC-eligible services or made HTC claims in the past 12 months, these results may merely indicate that not that many respondents have been in contact with the HTC system recently. In order to see to what extent this may be driving the results, Table 7 provides summary statistics of the answers by three groups: 1) those who have not made HTC-eligible purchases in the past 12 months (no purchases), 2) those who have made such purchases, but neither have nor will apply for HTC (purchases, no prior claims), and 3) those who either have applied for HTC or will do so for purchases made in the past 12 months (prior claims). Additionally, Figure 15 provides a graphical illustration of the mean answers by these groups. Although those with prior claims provide answers that are closer to the correct ones on average, there is still substantial variation also within this group. This is especially true in the case of the tax credit rate if one considers that the tax credit rate was 50% in 2019. The average response by those with prior claims then lies between the tax credit rates in 2019 and 2020. However, when asked about the maximum allowance and the example problem, the average of the answers made by those with prior claims differs statistically significantly from the correct answers. This would suggest that even while prior use of HTC is related to answers that are closer to the correct ones on average, people with prior HTC usage may still be unaware of all the relevant details of the system.

Table 7. Knowledge of HTC details, summary statistics by prior purchases and claims

	N	mean	sd	p50	min	max
Tax credit rate (Question 3A)						
No purchases	423	37.1	18.0	40	0	100
Purchases, no prior claims	44	35.9	17.0	37.5	10	100
Prior claims	154	44.7	16.8	40	8	100
Maximum allowance (Question 3B)						
No purchases	469	3914.9	6226.9	2500	0	100000
Purchases, no prior claims	43	5801.2	15347.2	2000	200	100000
Prior claims	158	3310.4	2349.8	2500	500	20000
Example problem (Question 3C)						
No purchases	507	626.3	553.9	400	0	4000
Purchases, no prior claims	54	632.6	562.3	400	50	3000
Prior claims	175	484.2	345.3	400	250	3000

Correct answers: tax credit rate 40% (50% in 2019), maximum allowance EUR 2250 (EUR 2400 in 2019), example problem EUR 300. No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

Figure 15. Figure 15: Knowledge of HTC details by prior purchases and claims

Note: Red horizontal lines indicate correct answers. Blue horizontal lines in tax credit rate and maximum allowance indicate correct answers in 2019. No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

4.2.2.3 Demand responses to HTC changes

The third set of questions concerns the way in which the survey respondents say they would react to changes in HTC. We are interested in this, because while the microeconometric methods applied in this study in conjunction with detailed administrative data provide evidence on how people *actually* responded to HTC changes, this may differ from the way people *think* they would respond. The questions are provided below:

- **Question 4A**: In 2019 the HTC rate was 50% of the value of work and in 2020 the HTC rate was 40% of the value of work. Imagine you are in a situation where you are considering buying renovation, housekeeping or nursing services in 2020. Would this 10-pp. decrease affect your willingness to buy? Yes/no.
  - If you answered yes, by what euro amount would you decrease your service purchases during a year?

- **Question 4B**: In 2020 the maximum amount of HTC is EUR 2250. If the maximum amount decreased to EUR 1000, would this affect your willingness to buy renovation, housekeeping or nursing services? Yes/no.
  - If you answered yes, by what euro amount would you decrease your service purchases during a year?

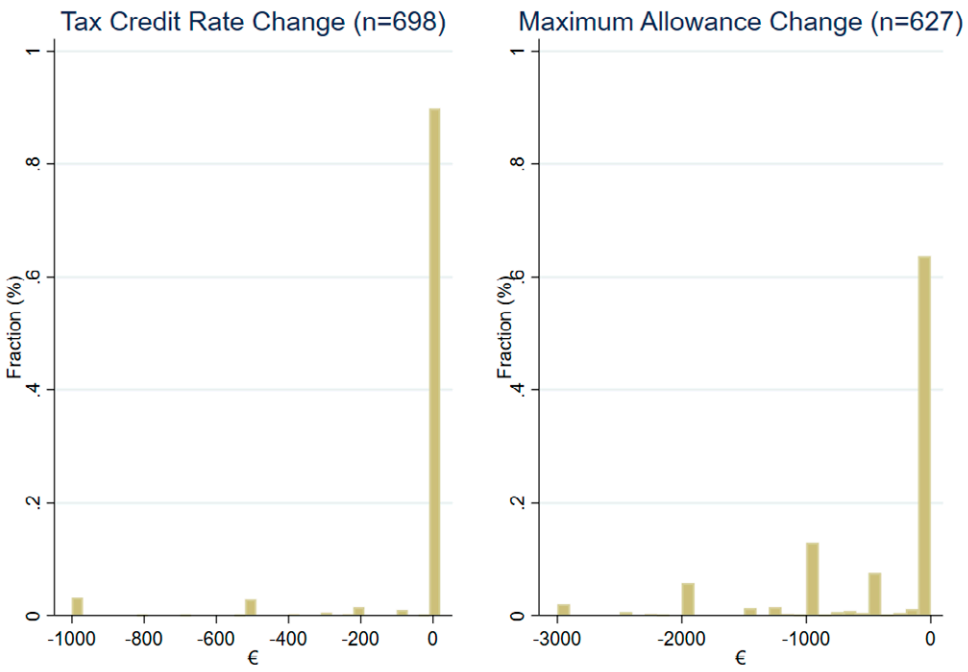
Table 8 provides summary statistics of the reported demand responses to the HTC changes in the tax credit rate and the maximum allowance. Figure 16 plots the distributions of the same answers. What is interesting here is that for those who reported sums, the median answer to both questions is that the changes would have a zero impact on demand. However, one should note that these answers also include those who did not report having bought HTC-eligible services in the past 12 months, so this may partially indicate that most respondents did not buy such services. Moreover, the questions do not take into account that service prices may react to changes in HTC, so that all the reported values should be considered as upper bounds. Additionally, the raw answers reported here may be hard to interpret.

Table 8. Reported demand responses to HTC changes, summary statistics

	N	mean	sd	p50	min	max
Tax credit rate change (Question 4A)	715	137.9	614.6	0	0	8,000
Maximum allowance change (Question 4B)	641	533	984.1	0	0	8,000

Note: Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. Question 4A: 160 responders answered the change would affect their willingness to buy, 626 responded it would not; Question 4B: 407 would affect, 387 would not affect.

Figure 16. Reported demand responses to HTC changes



Note: Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. 17 outliers excluded in tax credit rate change, 14 in maximum allowance change.

Therefore, we calculated elasticities of demand for the respondents. As many of them had reported not having purchased any HTC-eligible services in the past 12 months, we calculated the elasticities based on the average service purchase amounts (EUR 1747.53) by

E.g. if the respondent replied that a tax credit rate change from 50% to 40% would make her reduce her service purchases by EUR 100, her elasticity with regard to the tax credit rate would then be counted as (100/1747.53) / (10/50) = 0.286.

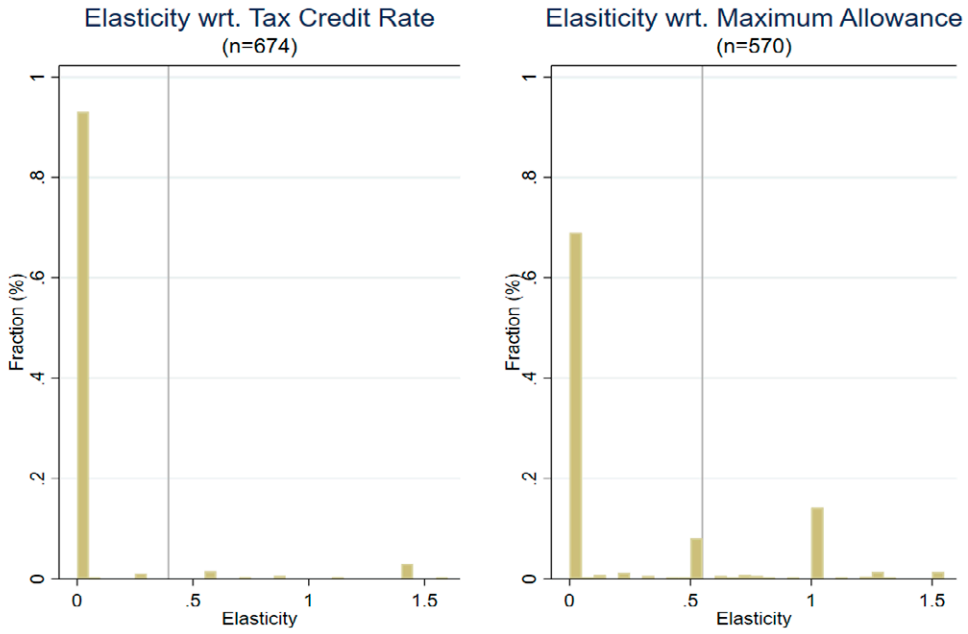
The summary statistics for these elasticities are provided in Table 9. Figure 17 plots their distributions. What is interesting here is that the average elasticities are quite high. Also, the respondents report their demand being less sensitive to changes in the tax credit rate than to changes in the maximum allowance on average. This is unexpected as changes in the maximum allowance impact only those who would buy services for large enough sums, whereas the tax credit rate impacts everyone who applies for HTC. However, this could be driven by differences in the questions: whereas the tax credit question does not provide any euro amounts, the maximum allowance question does contain euro amounts that may act as anchors for the respondents. Moreover, these are hypothetical responses to hypothetical situations, so the results may mask factors not set in the questions. E.g. the respondents may have different service categories in mind when responding and the elasticities in these categories may differ.

Table 9. Reported elasticities wrt. HTC details, summary statistics

	N	mean	sd	p50	min	max
Elasticity wrt. tax credit rate	715	0.394	1.758	0	0	22.889
Elasticity wrt. maximum allowance	641	0.549	1.014	0	0	8.240

Note: Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. Elasticities can be calculated only for those who reported having made service purchases in the past 12 months.

Figure 17. Reported individual-level elasticities of demand wrt. HTC details



Note: Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. 41 outliers excluded in tax credit rate, 71 in maximum allowance.

One should note that these individual-level elasticities need not correspond to the observed average elasticities, which are purchase value-weighted averages of the individual elasticities. The weighted average elasticity can be estimated by

$$weighted\ elasticity = \frac{total\ demand\ response\ /_{total\ purchases\ in\ the\ past\ 12\ months}}{relative\ change\ in\ HTC\ detail},$$

where the total demand response is the total reported reduction in demand by those with prior purchases. In Table 10, we provide estimates of these elasticities with linearized standard errors. This does reduce the elasticities somewhat.

Table 10. Average elasticity of demand wrt. HTC details

Elasticity	Estimate	N
wrt. Tax Credit Rate	0.207*** (0.058)	220
wrt. Max Allowance	0.190*** (0.039)	196
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

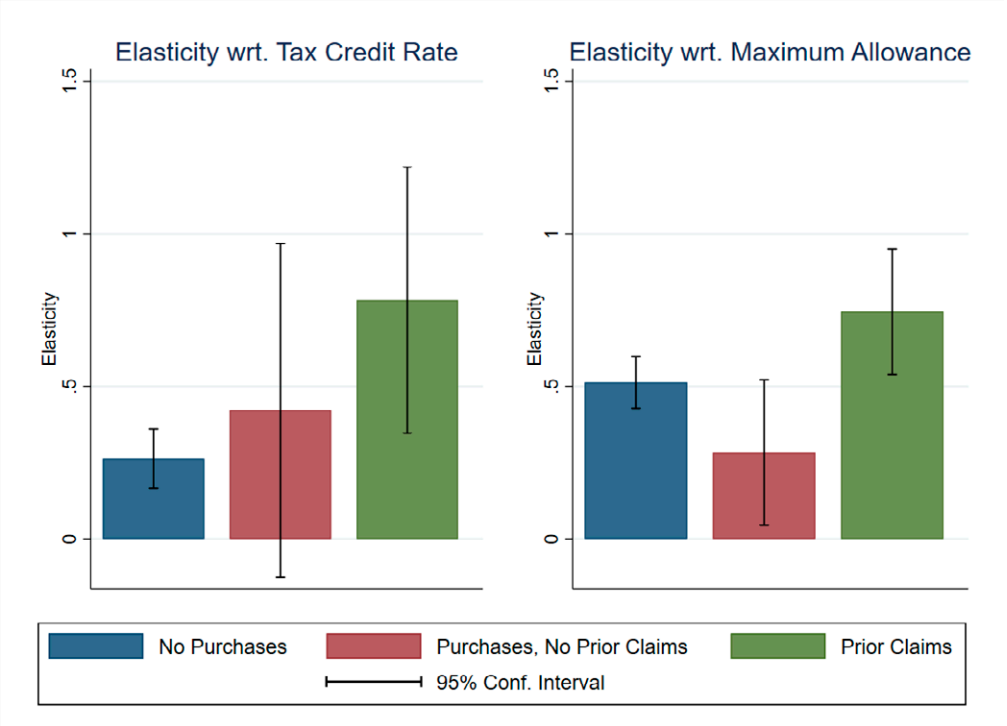
Note: Linearized standard errors (first-order Taylor approximation) in parentheses. Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. Table 11 reports summary statistics for both the demand responses and elasticities by prior service purchases and HTC claims. Figure 18 plots the group averages of demand elasticities with respect to HTC details. From the table, we can see that the majority of respondents in each category indeed respond that they would not change their demand. Moreover, those who have claimed HTC in the past 12 months report the highest elasticities.

Table 11. Demand responses and elasticities to HTC details by prior purchases and claims

	N	mean	sd	p50	min	max
Tax credit rate, demand response						
No purchases	495	91.7	386.6	0	0	5000
Purchases, no prior claims	55	147.3	722.6	0	0	5000
Prior claims	165	273.3	1245.6	0	0	8000
Tax credit rate, elasticity						
No purchases	495	0.262	1.106	0	0	14.306
Purchases, no prior claims	55	0.421	2.068	0	0	14.306
Prior claims	165	0.782	2.858	0	0	
Maximum allowance, demand response						
No purchases	445	497.8	890.2	0	0	5000
Purchases, no prior claims	48	274.6	818.7	0	0	5000
Prior claims	148	722.5	1243.6	0	0	8000
Maximum allowance, elasticity						
No purchases	445	0.513	0.917	0	0	5.150
Purchases, no prior claims	48	0.283	0.843	0	0	5.150
Prior claims	148	0.744	1.281	0	0	

Correct answers: tax credit rate 40% (50% in 2019), maximum allowance EUR 2250 (EUR 2400 in 2019), example problem EUR 300. No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

Figure 18. Reported elasticities wrt. HTC details by prior purchases and claims



Note: Tax credit rate change: from 50% to 40%. Maximum allowance change: from EUR 2250 to 1000. No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

4.2.2.4 Tax evasion in service purchases

The fourth set of questions asks the respondents about service purchases from tax-evading service providers. The questions are given below:

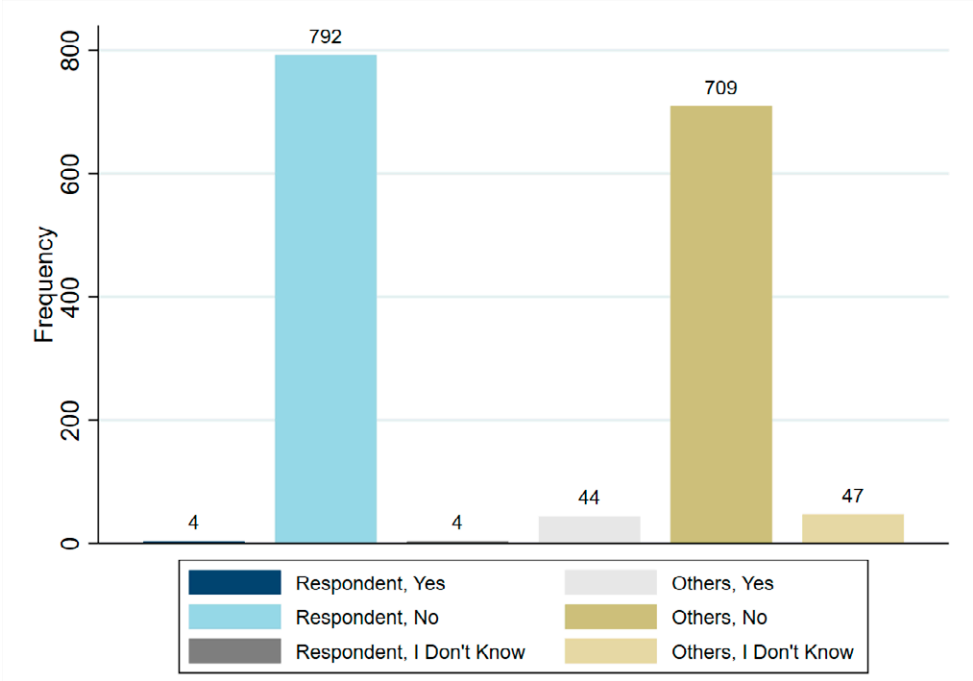
- **Question 5A**: In the past 12 months, have you had renovation, housekeeping or nursing work done knowing that the service provider is not going to pay taxes on the payment they received for the work? Yes/no.
  - If you answered yes, what was the euro amount of the services you purchased?

- **Question 5B**: Are you acquainted with anyone, such as someone in your neighborhood, who has had renovation, housekeeping or nursing work done in the past 12 months knowing that the service provider is not going to pay taxes on the payment they received for the work? Yes/no.
  - What was the monetary value of the service? Give your best estimate of the euro amount.

The rationale for including question 5B is that while many people would likely not report that they had purchased from tax evaders themselves even if they had done so, they may include themselves in their acquaintances in question 5B, and hence question 5B could provide us with a more truthful picture of the prevalence of tax evasion.

Figure 19 summarizes the number of respondents by reply to questions 5A and 5B. Only 4 responders admit to having purchased services from tax evaders whereas 44 reply that others have done so. Nevertheless, the vast majority of respondents reply negatively to both questions: 792 out of 800 reply that they have not purchased from tax evaders and 709 out of 800 reply that they are not acquainted with anyone who has made such purchases.

Figure 19. Figure 19: Reported purchases from tax evaders



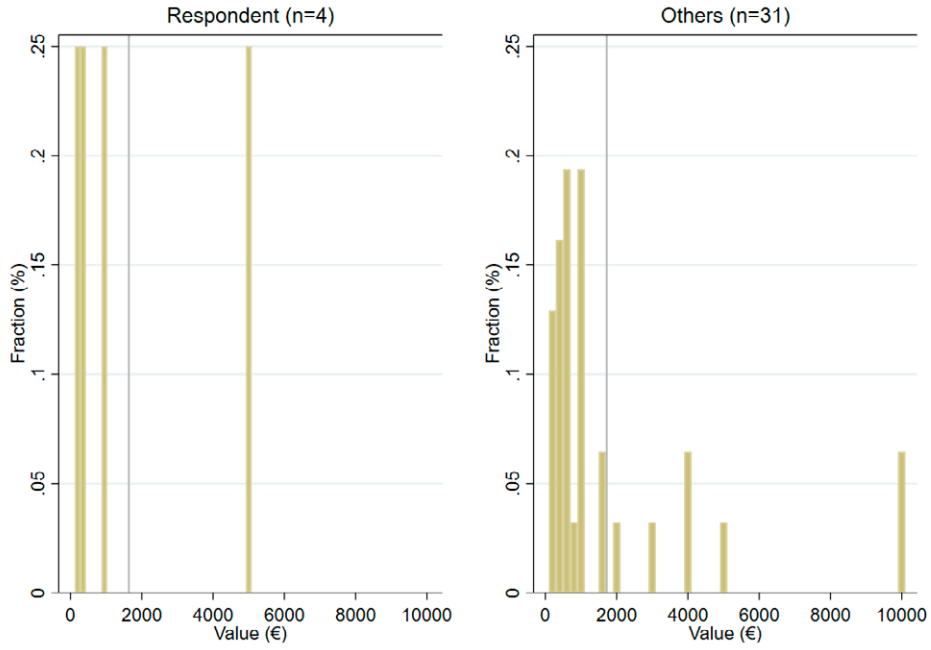
Note: This figure plots the frequencies of respondents' answers to questions 5A and 5B regarding knowing about tax evasion. The three bars on the left denote the frequencies of answers to the question regarding purchasing from tax evading suppliers yourself and the right bars denote the answer to the question about knowing if anyone they know had purchased from tax evading suppliers.

Table 12 provides summary statistics on the euro amounts that have been purchased from tax evaders. Figure 20 plots the distributions of the same answers. Interestingly, the mean sum (EUR 1637.5) when the respondent is the buyer is close to the mean sum when the buyer is someone else (EUR 1722.6). This could suggest that if these figures are underreported, they are so to a similar extent, although this could just be coincidental considering the small number of observations.

Table 12. Purchase amounts from tax evaders, summary statistics

	N	mean	Sd	p50	min	max
Responder, amount	4	1637.5	2268.4	675	200	5000
Others, amount	31	1722.6	2527.2	800	100	10000

Figure 20. Value of purchases from tax evaders



Note: Vertical lines indicate distribution means.

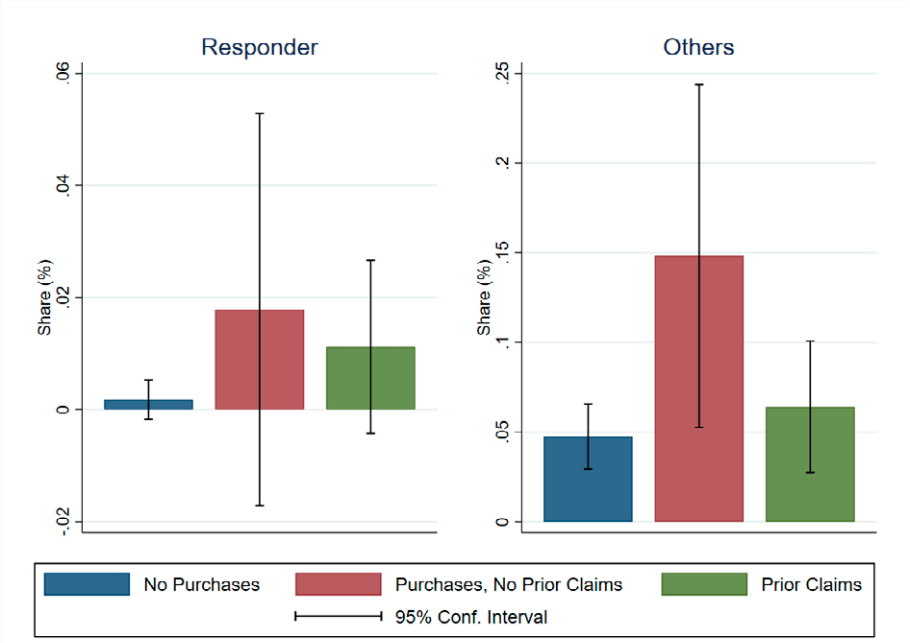
Table 13 provides group-level summary statistics on purchases from tax evaders by prior purchases and claims. Figure 21 plots the group shares of those reporting that they have made such purchases and the shares of those reporting that they know someone who has. Interestingly, those who have made prior service purchases in the past 12 months but have not claimed nor will claim HTC for the purchases seem more likely to know others who have purchased services from tax evaders.

Table 13. Purchases from tax evaders, summary statistics by prior purchases and claims

	N	mean	sd	p50	min	max
Responder						
No purchases	561	0.0018	0.0422	0	0	1
Purchases, no prior claims	56	0.0179	0.1336	0	0	1
Prior claims	179	0.0112	0.1054	0	0	1
Respondent, amount (EUR)						
No purchases	1	1000	.	1000	1000	1000
Purchases, no prior claims	1	350	.	350	350	350
Prior claims	2	2600	3394.1	2600	200	5000
Others						
No purchases	527	0.0474	0.2128	0	0	1
Purchases, no prior claims	54	0.1481	0.3586	0	0	1
Prior claims	172	0.0640	0.2454	0	0	1
Others, amount (EUR)						
No purchases	18	1988.9	2496.3	1000	100	10000
Purchases, no prior claims	6	2000	3923.6	450	200	10000
Prior claims	7	800	408.2	800	300	1500

Note: Respondent: respondent reports having made purchases from tax evaders, Others: respondent reports having acquaintances who have made purchases from tax evaders, No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

Figure 21. Share reporting purchases from tax evaders by prior purchases and claims



Note: Respondent: respondent reports having made purchases from tax evaders, Others: respondent reports having acquaintances who have made purchases from tax evaders, No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

An interesting question is whether the prevalence of tax evasion when asked about others also reflects unreported tax evasion by the respondents themselves. One can provide some evidence on this by looking at the share of those who have purchased HTC-eligible services but have decided not to claim HTC. Note that if one buys from tax-evading firms and knows of it, one would not apply for HTC for these purchases (one would not have a receipt). Hence, if purchases and claims are fairly truthfully reported and people report some of their own purchases as being from tax evaders when asked about acquaintances, one would expect to see a larger share of respondents with purchases but no claims among those who report having acquaintances who have purchased from tax evaders.

Table 14 provides regression results testing this notion. It seems that those who have reported others are indeed less prone to apply for HTC for their own purchases. However, when age groups are included in the regression, the coefficient is no longer statistically significant. However, this may be simply due to a lack of power as there are only 226 observations available. Moreover, the coefficient for having reported others is fairly stable.

Table 14. HTC claims and service purchases by age group

	Claims if Purchases			
	(1)	(2)	(3)	(4)
Reported others	-0.199* (0.177)	-0.175 (0.118)	-0.176 (0.118)	-0.179 (0.118)
35-49 old		0.089 (0.086)	0.089 (0.087)	0.088 (0.088)
50-65 old		0.171** (0.079)	0.171** (0.079)	0.165** (0.080)
Gender dummy			X	X
Area dummies				X
Observations	226	226	226	226

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: All dependent variables are dummies. Claims if purchases indicate whether the respondent has applied for HTC when the respondent has purchased services.

4.2.2.5 Covid-19 and service purchases

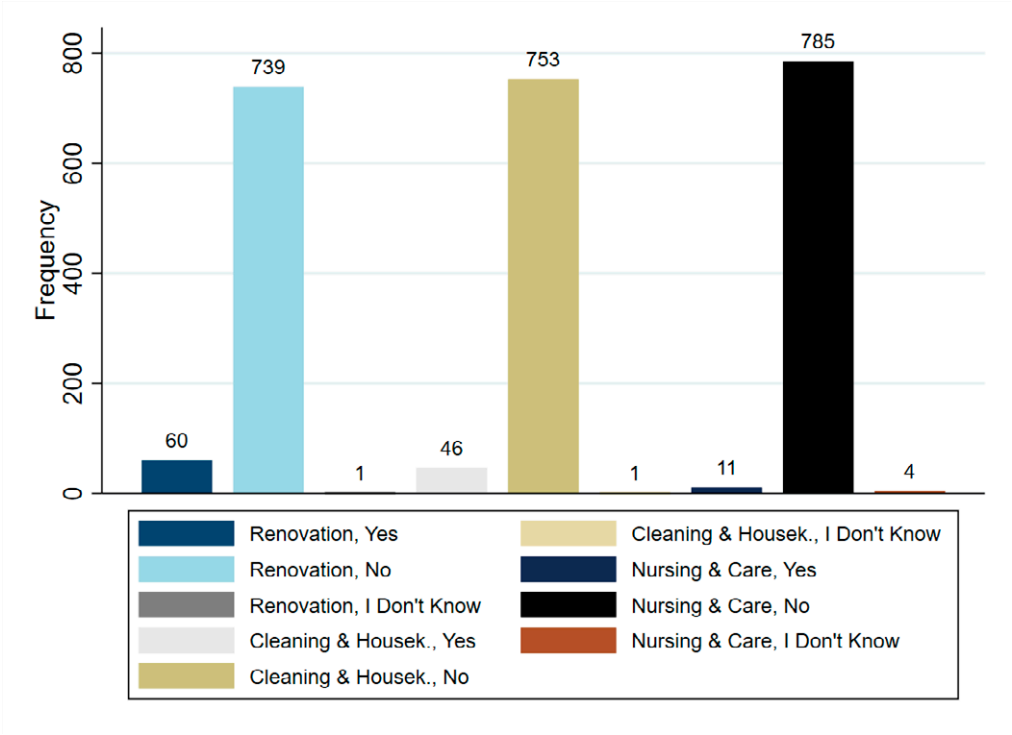
The final set of questions concerns the effects of the Covid-19 pandemic on service demand. While interesting in itself, information about the impact of the pandemic on service purchases is also important in interpreting the results of the survey: if the coronavirus impacted e.g. different service markets differently, the survey results may provide a more conditional picture of service demand and HTC usage in normal times. The questions are given below:

- **Question 6:** Have you decided to postpone or not to order the following services due to the exceptional circumstances caused by the coronavirus? Renovation services? Cleaning/housekeeping services? Nursing/care services?
  - What is the euro amount of the services that you have decided to postpone or not to order? Renovation services? Cleaning/housekeeping services? Nursing/care services?

Figure 22 summarizes the number of respondents by reply to question 6. The largest group affected was in renovation (60 respondents), followed by cleaning and housekeeping (46), and nursing and care (11). The ratio of those whose purchases were affected by Covid-19 to those who had purchased services in the past 12 months was

34.7% (60/173) for renovation, 54.1% (46/85) for cleaning, and 91.7% (11/12) for nursing services. This may be due to the higher level of physical proximity related to cleaning and especially nursing services compared to renovation services. Table 15 provides summary statistics for the purchase amounts that respondents said they had decided to postpone or not to order due to the coronavirus, and Figure 23 plots the distributions of these amounts.

Figure 22. Has the coronavirus affected your purchases?



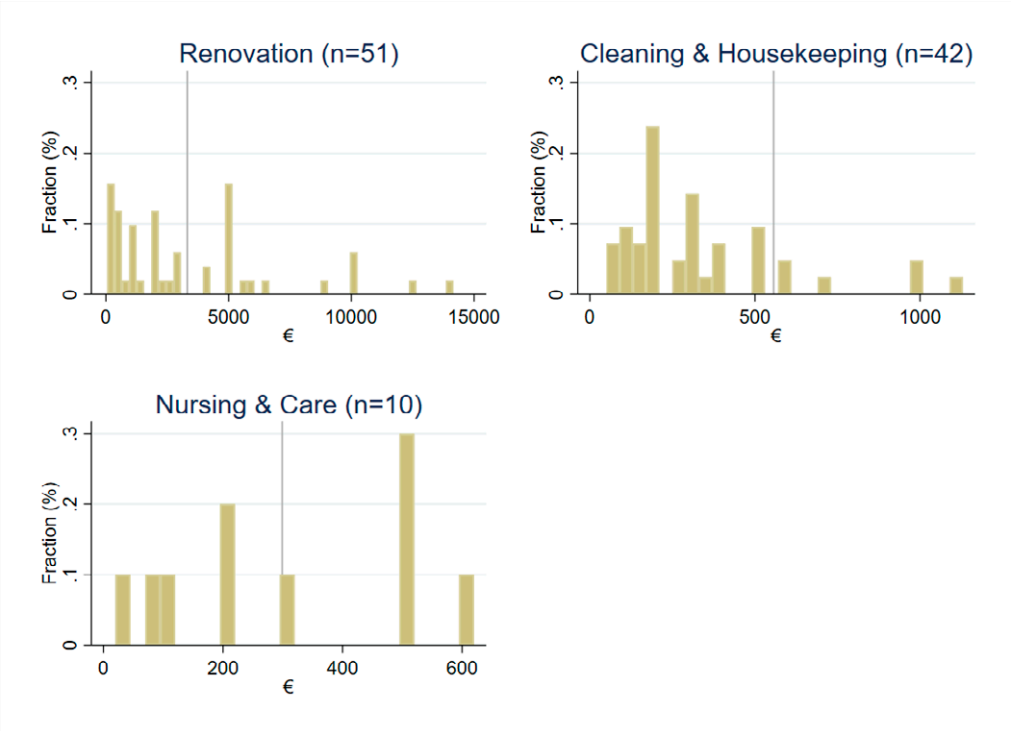
Note: This figure plots the frequencies of answers to question 6 about if Covid-19 has affected service purchases.

Table 15. Amount not purchased due to the coronavirus, summary statistics

	N	mean	sd	p50	min	max
Renovation, amount	51	3316.1	3421.2	2000	50	14,000
Cleaning & housekeeping, amount	43	556.5	1495.4	280	50	10,000
Nursing & care, amount	10	299	211.2	250	20	600

Note: Excluding respondents with no purchases in the service category.

Figure 23. Amount not purchased due to the coronavirus.



Note: Vertical lines indicate distribution means. One outlier excluded in cleaning & housekeeping.

The number of respondents saying their service purchases were affected and the mean amounts they reported are relatively high. However, this may be because the survey was conducted early in the pandemic (April 2020) when people may have been more cautious. The results of this survey should be interpreted with this in mind. Nevertheless, if the people who reported service purchases in the past 12 months are similar to those whose purchases were affected by Covid-19, the results of the survey would be representative. This could be the situation e.g. if the main difference between the groups was that those not affected had made their purchases before the pandemic: after all, even at the end of the survey period almost 10 of the 12 elapsed months asked about had taken place before the first corona death in Finland.

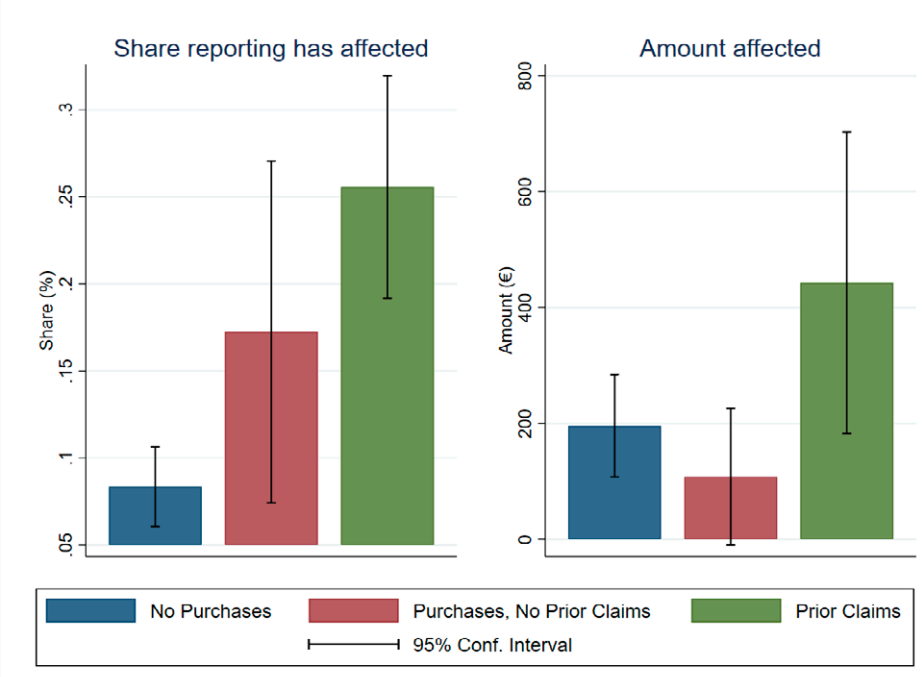
Table 16 reports summary statistics on the effects of the Covid-19 epidemic on service purchases by prior purchases and claims. Additionally, Figure 24 plots the group shares and average amounts affected. As is to be expected, those with prior purchases are more prone to respond that Covid-19 has affected their service purchases and report larger amounts on average. A large proportion – around a quarter – of those with prior claims report having reduced their service purchases, with a mean decrease of around EUR 400 for all those with prior claims. This would suggest that the pandemic had impacted the service market substantially at the time of the survey.

Table 16. Effect of the coronavirus epidemic, summary statistics by prior purchases and claims

	N	mean	sd	p50	min	max
Has affected						
No purchases	562	0.084	0.277	0	0	1
Purchases, no prior claims	58	0.172	0.381	0	0	1
Prior claims	180	0.256	0.437	0	0	1
Has affected, amount (EUR)						
No purchases	561	195.9	1068.0	0	0	10000
Purchases, no prior claims	58	107.9	457.8	0	0	2500
Prior claims	180	442.6	1781.7	0	0	14000

Note: Has affected: respondent has postponed or decided not to order services due to the coronavirus pandemic. No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

Figure 24. Effect of the coronavirus pandemic on service purchases by prior purchases and claims



Note: No purchases: no service purchases in the past 12 months. Purchases, no prior claims: service purchases in the past 12 months but has neither applied for nor will apply for HTC. Prior claims: has claimed or is going to claim HTC for purchases made in the previous 12 months.

4.2.3 Discussion

The main takeaways from the survey results are that 1) only a small minority of the working-age population makes HTC-eligible service purchases and HTC claims, 2) the details of the HTC system are not well known, 3) people tend to report that they would react substantially to changes in the HTC system, 4) reports of tax evasion are not very common, and 5) the coronavirus pandemic had affected service purchases substantially when the survey was conducted.

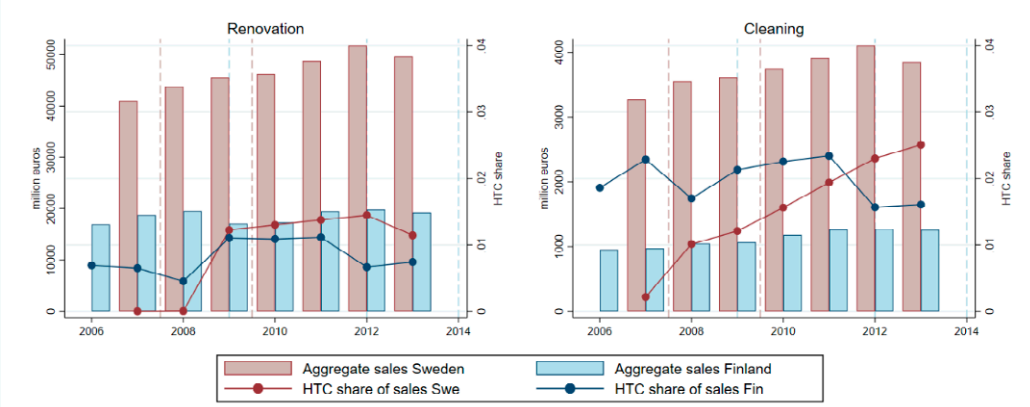
4.3 Firms

We describe here the firm-level data for the cleaning and renovation industries in Finland and Sweden. We can identify in our data which firms provided HTC-eligible services and how much credit was claimed. Figure 25 shows the sum of aggregate sales and the share of HTC claims in the renovation and cleaning sectors in Finland and Sweden. It is evident that aggregate sales are clearly higher in both sectors in Sweden compared to Finland (right axis), which is expected as Sweden is otherwise a larger economy than Finland.[8] There is some increase in aggregate sales in both industries in Sweden, but no clear increase in Finland.

The share of HTC relative to total sales is given in the connected line plot in Figure 25 and the right axis shows the scale. The share of HTC is quite similar across countries. In Sweden the share increases very rapidly in the cleaning industry after the introduction of the HTC system in 2007. In 2012, Finland cut the maximum credit from EUR 3000 to 2000, which clearly decreases the HTC share of total sales in 2012 for both Finnish sectors. However, aggregate sales in the industry stayed around at the same level, suggesting that the drop in the share results largely from the mechanical change in the rule rather than any behavioral effect towards the consumption of services.

8 Values in Swedish SEK were first adjusted by the consumer price index to January 2006 and then adjusted by the exchange rate of January 2006 to make values comparable between the countries. For Finland, values in EUR are also at the January 2006 level.

Figure 25. Aggregate sales within industry and the amount of HTC relative to aggregate sales (real values) in 2006–2013



Note: Sales of firms deflated to 2006 price level. Blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively.

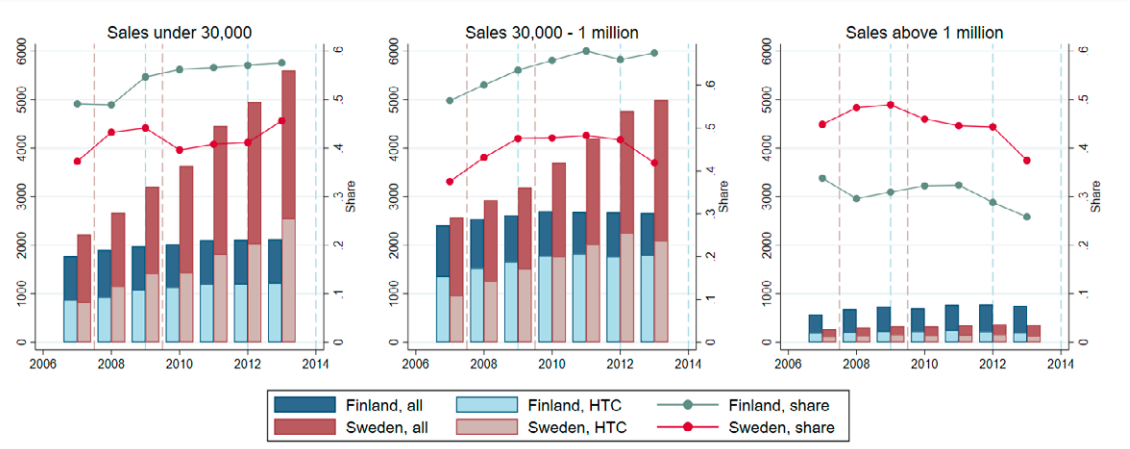
Figure 26 shows the number of all firms in the renovation and cleaning industries and shows the share of those firms providing HTC-eligible services in Finland and Sweden. The number of renovation and cleaning firms has increased in Sweden much more rapidly than in Finland. This development seems to be similar in the total number of firms and among firms providing HTC-eligible services. Therefore, the figure suggests that the increase in the number of firms is an overall economic trend in Sweden that is not necessarily related to HTC as it does not clearly mirror changes in the HTC rules. This is especially visible in the bar plot for the renovation industry in Sweden, where there was an increasing trend already before the adoption of HTC in 2009, and no visible break in the trend in 2009.

Figure 26. Number of firms in HTC industries and providing services that were used to claim HTC

Note: The dark red and blue bars plot the number of all firms in the HTC-eligible industry and the lighter bars the number of firms providing services for which customers received HTC. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively.

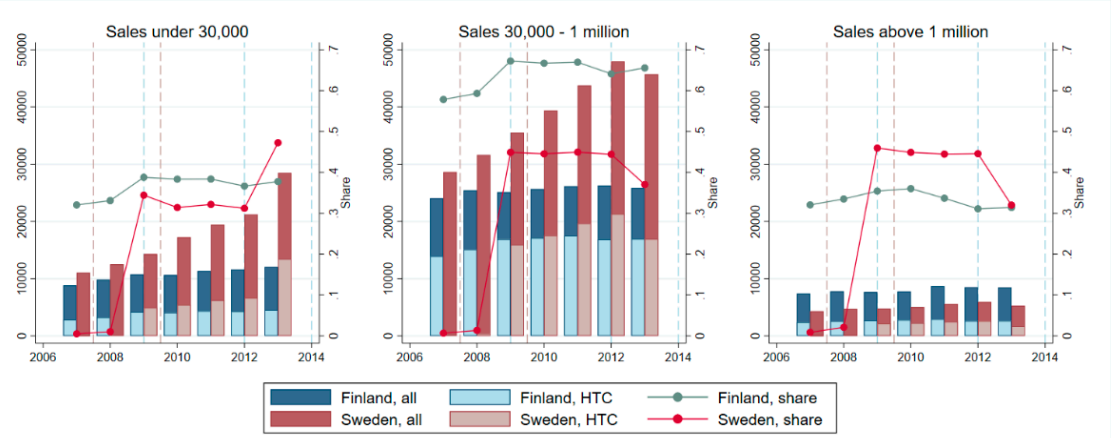
Figures 27 and 28 show the number of firms in both HTC-eligible industries in different size categories. Figure 26 showed a clear increase in the number of firms in Sweden, and Figures 27 and 28 illustrate that the increase in the number of firms is driven by an increase in the number of relatively small firms with sales below EUR 1 million (≈SEK 10 million). This is somewhat expected as Figure 24 depicts a less striking increase in aggregate sales. While there are more firms in both industry categories in Sweden, it seems that in Finland the share of firms providing HTC-eligible services is somewhat higher among smaller firms. A possible reason for this is that in Sweden the system is more complex for firms as they are the ones who apply the HTC rules. In Finland, on the other hand, it is the customer who does the tax filing and thus bears the costs of reporting, so there is hardly any cost for the firm in this system. While there are more firms with sales under EUR 1 million in Sweden, there are more firms with sales above EUR 1 million in Finland.

Figure 27. Number of cleaning firms in size categories (real values)



Note: The dark red and blue bars plot the number of all cleaning firms in the size category and the lighter bars the number of cleaning firms providing services for which customers received HTC. The connected scatter plots show the shares of HTC firms in the industry category. Firms' sales of are deflated to the 2006 price level. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively.

Figure 28. Number of renovation firms in annual sales size categories (real values)



Note: The dark red and blue bars plot the number of all firms in the renovation industry in the size category and the lighter bars the number of firms providing services for which customers received HTC. The connected scatter plots show the shares of HTC firms in the industry category. Firms' sales are deflated to the 2006 price level. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively.

Table 17. Summary statistics of cleaning firms in Finland and Sweden, monetary values in thousands

	2008							
	FIN - All mean	sd	FIN - HTC mean	sd	SWE - All mean	sd	SWE - HTC firms mean	sd
Sales	251	6,152	374	8,250	7,895	122,567	8,699	130,390
Sales (VAT)	221	5,824	352	8,081	7,639	120,788	8,453	128,497
Inputs	63	1,695	97	2,351	2,688	50,500	2,921	53,711
Labor costs	110	3,108	174	4,168	9,798	163,016	10,898	172,568
Profit	29	212	35	284	411	3,049	421	3,190
Deducted VAT	14	373	21	517	672	12,625	730	13,428
HTC per firm	3.8	17.8	7.4	24.2	76.5	506	173	750
Limited comp.	19.7%		19.2%		38.2%		34.1%	
Sole prop.	59.3%		63.4%		61.6%		65.7%	
Observations	5125		2658		4466		1973	

	2011							
	FIN - All mean	sd	FIN - HTC mean	sd	SWE - All mean	sd	SWE - HTC firms mean	sd
Sales	294	7,664	411	9,634	5,171	98,714	4,135	85,346
Sales (VAT)	245	7,013	368	9,147	4,905	95,192	3,905	82,843
Inputs	77	2,482	115	3,238	1,582	35,360	1,218	29,400
Labor costs	130	3,679	188	4,624	7,585	140,075	6,709	137,213
Profit	31	323	37	401	326	2,891	296	2,745
Deducted VAT	18	571	26	745	395	8,840	305	7,350
HTC per firm	6.1	31.9	10.4	41.1	110.4	603.4	215.6	830
Limited comp.	20.7%		21.5%		32.8%		27.4%	
Sole prop.	58.5%		63.4%		66.9%		72.1%	
Observations	5554		3262		7807		3998	

Note: This table provides summary statistics for cleaning firms in Finland and Sweden in 2008 and 2011. The values are in thousands and for Finnish firms are in nominal euros and for Swedish firms in nominal SEK. SEK 10≈ EUR 1. Sales refers to sales as reported in tax returns and Sales (VAT) refers to sales reported in VAT filings. Inputs consists of material inputs such as material and intermediate goods. Labor costs includes payroll taxes and other non-wage costs; the income of sole proprietors is taxed as profit, so labor costs are 0 for such firms. Profit refers to taxable profit reported in tax returns less VAT in aggregate VAT deduction claims for the year. HTC per firm is calculated by assigning HTC claims to each firm based on the firm ID reported in the customer's tax return.

Table 17 gives summary statistics for cleaning firms in Finland and Sweden in 2008 and 2011. The table gives descriptive statistics for all firms in the industry and separately for those firms that sold services that were used to claim HTC. The values are in thousands of EUR for Finland and thousands of SEK for Sweden, without accounting for inflation. These summary statistics highlight several points brought up in the previous figures. In Sweden, the number of cleaning firms has increased notably, and at the same time average sales have decreased. In Finland there is no such change. The HTC for each firm is calculated by assigning the claimed HTC for each firm ID as customers have to report the firm ID in their tax return. The average HTC per firm is around twice as high per firm in Sweden as in Finland. However, note that the tax credit was also higher in Sweden in 2008 and 2011. In both countries, the majority of cleaning firms are sole proprietors. The corresponding summary statistics for renovation firms in Finland and Sweden are given in Table 25 in the Appendix.

Table 18 describes the summary statistics for Finnish renovation firms and control industries and separately for the CEM-matched sample (unweighted) and the whole industry group. For example, Ren – All refers to all firms in the renovation industry and Ren – CEM to renovation firms in the matched sample. While the firms in the control group are on average larger, after the matching the groups are more alike even without weighting.

Table 18. Summary statistics of Finnish renovation and control firms

	2008							
	Ren - All mean	sd	Ren - CEM mean	sd	Contr - All mean	sd	Contr - CEM mean	sd
Sales	573,781	9,718,734	573,462	9,734,355	1,178,926	25,269,878	390,691	19,627,990
Sales (VAT)	500,552	8,532,272	500,918	8,545,035	711,186	9,546,311	204,054	344,499
Inputs	332,740	6,576,796	332,836	6,586,619	584,788	8,806,474	144,262	2,746,784
Labor costs	101,456	1,390,743	101,311	1,392,862	135,478	2,609,688	47,147	111,386
Profit	44,355	279,090	44,295	279,277	45,721	538,885	33,161	219,383
Deducted VAT	73,203	1,446,895	73,224	1,449,056	128,653	1,937,424	31,738	604,292
HTC per firm	2619	14,573	2621	14,577	43	682	38	467
Observations	35,573		35,466		34970		33,158	
	2011							
	Ren - All mean	sd	Ren - CEM mean	sd	Contr - All mean	sd	Contr - CEM mean	sd
Sales	550,484	10,187,001	633,057	11,035,656	1,085,343	21,226,480	410,996	15,888,364
Sales (VAT)	412,557	8,112,996	506,574	9,037,772	669,783	9,379,916	242,978	622,568
Inputs	318,884	6,924,618	388,898	7,688,949	533,254	7,951,531	149,151	548,542
Labor costs	97,244	1,293,214	112,442	1,420,415	140,047	2,532,293	56,537	148,650
Profit	35,375	204,571	39,267	229,932	41,918	301,580	33,488	168,323
Deducted VAT	73,343	1,592,662	89,447	1,768,458	122,649	1,828,852	34,305	126,165
HTC per firm	5993	33,086	6743	36,509	130	1648	130	1607
Observations	38,556		27,808		35,211		27,737	

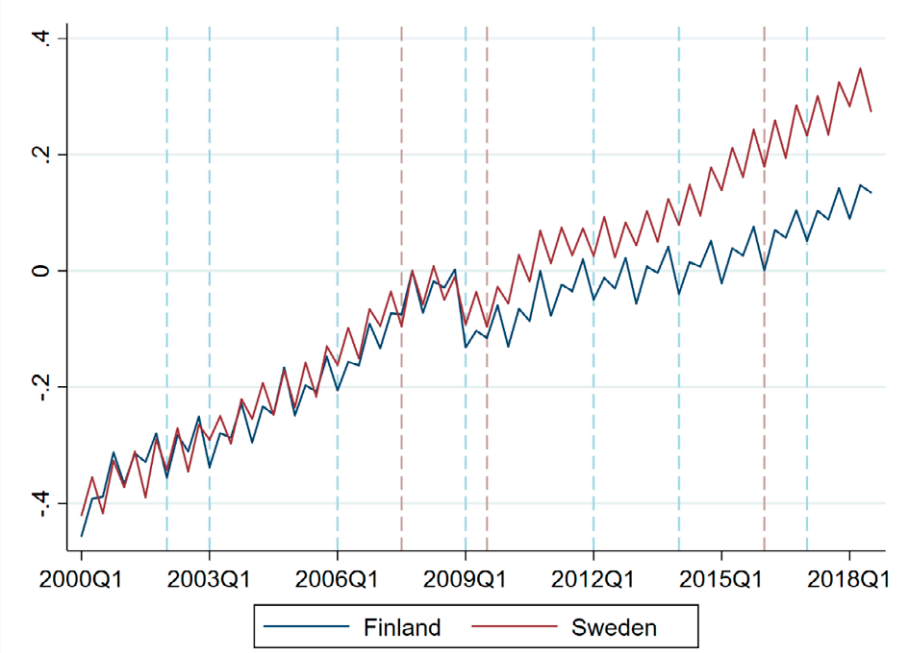
Note: This table provides summary statistics for renovation firms and control firms in Finland in 2008 and 2011. The exact industry codes included are listed in Appendix Tables 8 and 9. Sales refers to sales reported in tax returns and Sales (VAT) refers to sales reported in VAT filings. Inputs consists of material inputs such as materials and intermediate goods. Labor costs includes payroll taxes and non–wage costs. Profit refers to taxable profit reported in tax returns and deducted VAT to the aggregate VAT deduction claims for the year. HTC per firm is calculated by assigning HTC claims to each firm based on the firm ID reported in customers' tax returns .

4.4 Macro-level description

Here we describe the macro trends in the Finnish and Swedish economies to validate our comparison of the two countries in the causal analysis of the cleaning industry. In Figure 29 we plot the development of log value added relative to the last quarter of 2007. These data on the total amount of value added from the OECD statistics for Sweden and Finland show that the macroeconomic trends follow each other fairly well before the financial crisis that affected the countries from 2009 but are different after that. The figure shows that the economic downturn in the beginning of 2009 hit Finland much harder than Sweden. This event is in the middle of our observation period, and thus might invalidate our identification strategy.

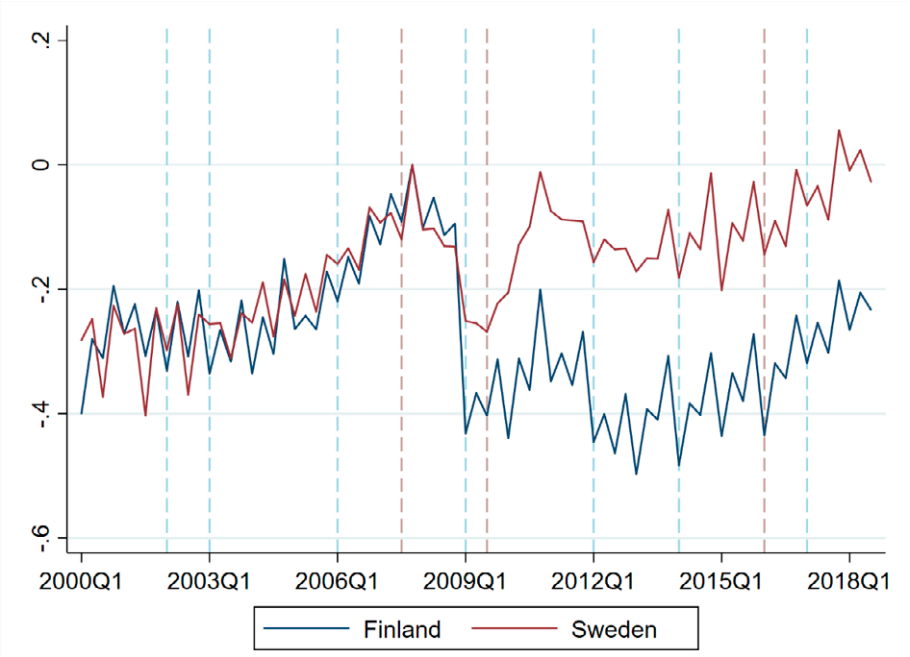
This divergence in the value added is even more pronounced in manufacturing sectors, as is visible in Figure 30. However, when we plot the same statistics for all services in Figure 31, there seems to be no divergence before mid-2013. Therefore, it seems that the different development post-2008 in the national aggregates is mostly driven by manufacturing and other industries that are not in the service sector, such as the cleaning industry. Thus, the comparison across the two countries around the 2009 reform seems a valid strategy when focusing on the service sector. Note that all services includes retail, hospitality, transportation and other large service industries, the cleaning industry being one small part of this group. Thus, this macro-level analysis just shows the economic background of the analysis, but is not a test of the effectiveness of the HTC in the cleaning industry.

Figure 29. Logarithmic value added of all industries in Finland and Sweden



Note: Log value added relative to the last quarter of 2007. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden. Source: Eurostat

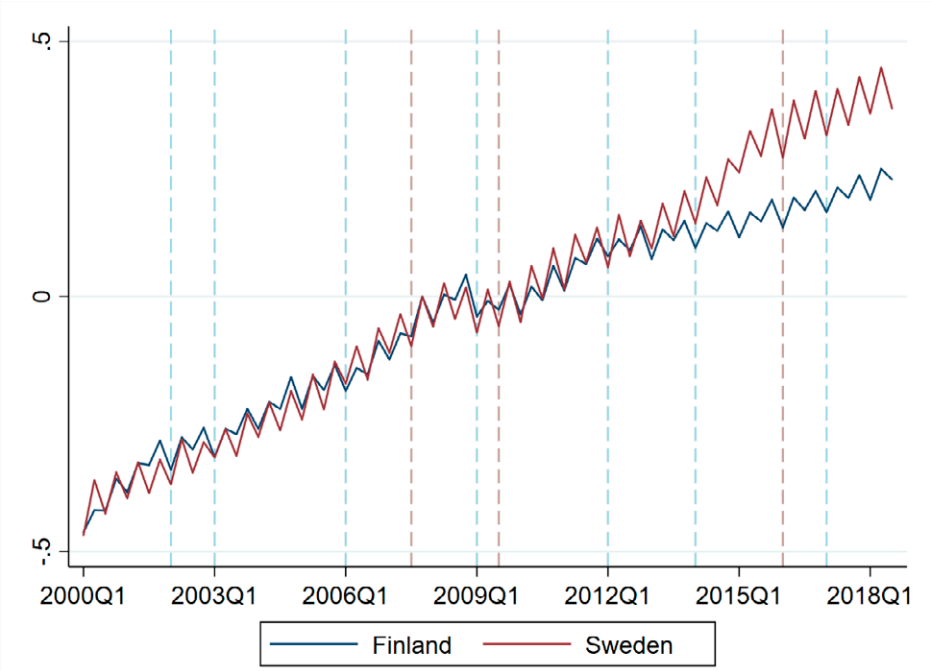
Figure 30. Logarithmic value added of manufacturing industries in Finland and Sweden



Note: Log value added of manufacturing industry relative to the last quarter of 2007. Manufacturing includes two-digit industry codes between 10-33 in both countries. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden. Source: Eurostat

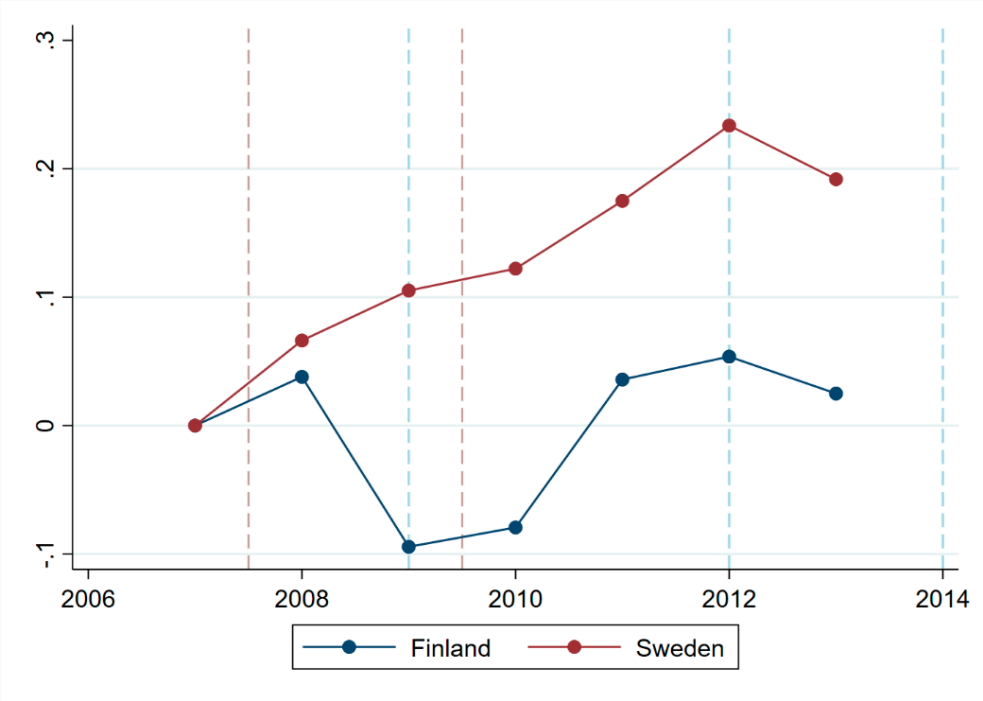
To show country-level statistics relevant for the renovation industry (not included in manufacturing, for example), in Figure 32 we aggregate from our micro data the changes in total sales in the renovation industry by country over time relative to 2007. There seems to be a clear dip in Finland due to the Great Recession starting in 2009 that leaves a clear gap between the trends across countries. This obviously creates challenges in identifying the effects of HTC in a comparison of the renovation industry in these countries. Thus, as explained above, we use an alternative approach, CEM matching within Finland, in studying the renovation industry in Finland around the HTC reform in 2009.

Figure 31. Logarithmic value added of service sector in Finland and Sweden



Note: Log value added of the service sector relative to the last quarter of 2007. The service sector includes two-digit industry codes between 45-98 in both countries. The blue and red vertical lines denote changes in the Finnish and Swedish HTC systems respectively. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden. Source: Eurostat

Figure 32. Log difference of aggregate sales in renovation industry relative to 2007



Note: Sales of firms deflated to 2006 price level. Blue and red vertical lines denote changes in Finnish and Swedish HTC systems respectively.

5 Evidence of the impact of HTC on consumption

In this section we provide evidence of the impact of HTC on the value of reported sales among firms providing cleaning or renovation services, and therefore on the consumption of household services and on tax evasion. We first perform the analysis on the cleaning industry by comparing Swedish firms to Finnish firms in the cleaning industry before and after the introduction of the HTC system in Sweden. Second, we analyze the renovation industry by comparing Finnish renovation firms to other Finnish firms in similar industries before and after the large increase in the maximum amount of HTC in January 2009.

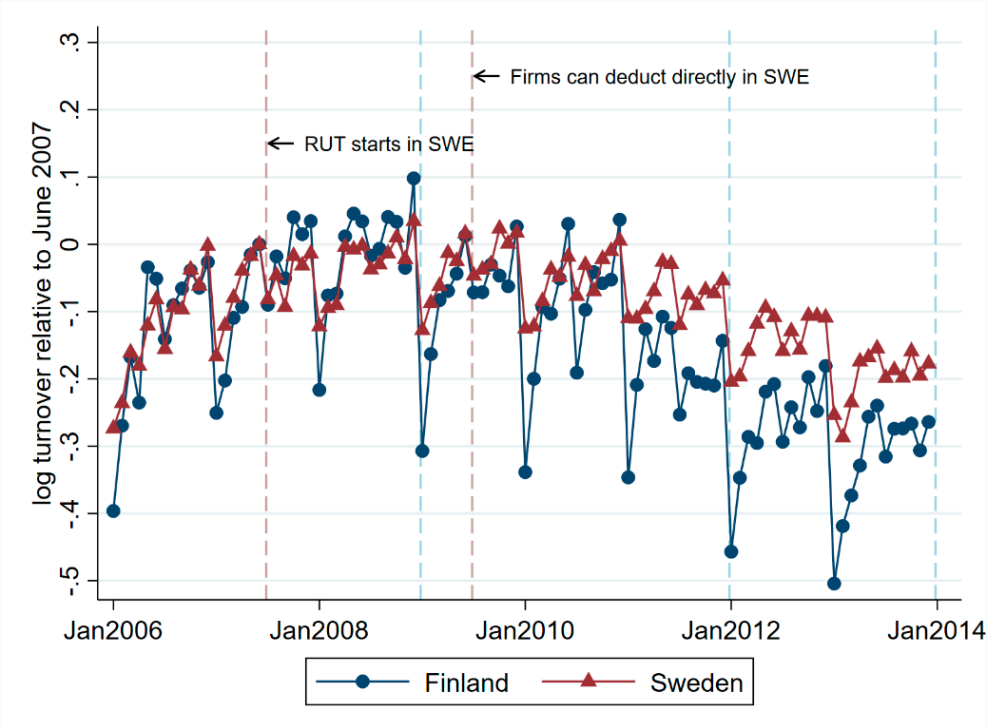
5.1 Cleaning industry

Our aim is to find transparent evidence of the effect of HTC policies on the consumption of cleaning services. To this end our best hope is to utilize the introduction of HTC for cleaning services in Sweden in July 2007, because there were no changes in Finnish HTC policy at the time and the overall economic development between the countries seems to have been quite smooth and similar. We also utilize the 2009 reform in Sweden that switched the claiming responsibility from consumers to firms, but that part of the analysis suffers from empirical challenges that we discuss in detail below.

We begin the analysis of the cleaning industry by showing the development of monthly sales in our firm-level data for the cleaning industry by country. Note that these sales are presented here and throughout this report in producer price value. We do this by regressing monthly indicators against monthly sales (in logs) by country with firm-level fixed effects. The series are weighted by firm size to give a better picture of changes in aggregate sales and thus aggregate consumption, i.e. we weight the estimates by the pre-reform market shares of firms in the cleaning industry. The unweighted series are given in the Appendix. This allows us to show the development of the average value of reported sales in log terms relative to the starting period. Figure 33 shows the development of point estimates from this regression relative to June 2007, which is scaled to zero in the figure. Two clear observations arise from the figure: 1) there seems to be a lot of seasonality in the data within years, but this is apparently similar in both countries, and 2) the development before the introduction of HTC in Sweden in 2007 is very similar between the countries, providing evidence that the pre-trends are well in line with each other and supporting the identification assumptions required in the DiD strategy.

Figure 34 shows comparable statistics for inputs that are credited against paid VAT. The seasonality seems very similar to that presented in Figure 33 and the pre-trends are well in line between the countries. To make sure that the seasonality does not mask important behavioral responses, we next exclude within-year variation from the analysis.

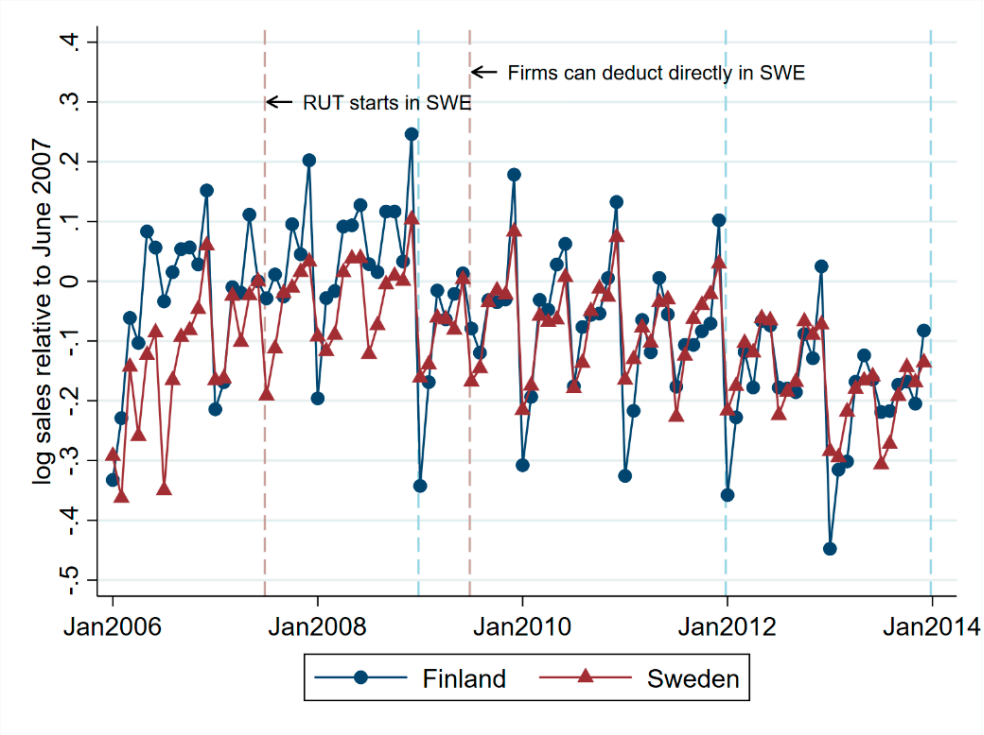
Figure 33. Cleaning – Firm-level trends in sales relative to June 2007



Note: Coefficients from a firm-fixed effect regression of log monthly turnover on month, binary variables relative to June 2007. Sales are adjusted to price level of January 2006 and weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. The red dashed vertical lines denote the introduction of HTC for cleaning

sector (RUT) and the adoption of the invoicing system in Sweden, and the blue dashed vertical lines denote changes in the household tax credit parameters in Finland.

Figure 34. Cleaning – Firm-level trends in input spending relative to June 2007



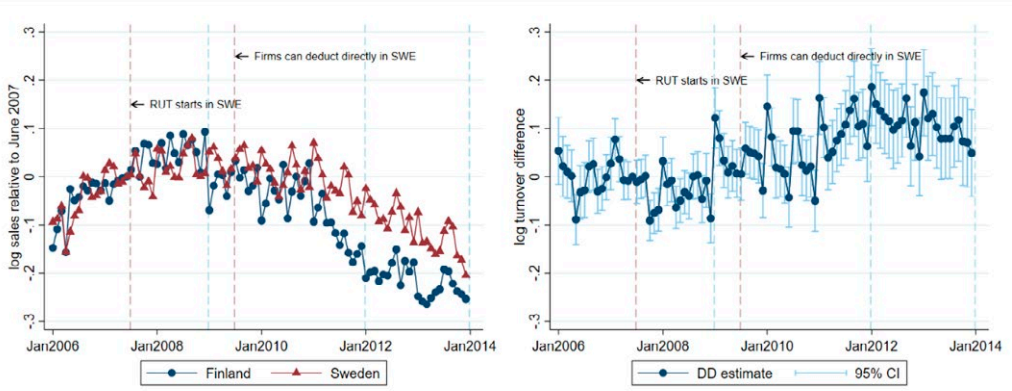
Note: Coefficients from a firm-fixed effect regression of log monthly input spending reported for VAT purposes on month, binary variables relative to June 2007. Material input spending refers to input usage for which firms claim VAT deductions. Input spending is adjusted to price level of January 2006 and weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. The red dashed vertical lines denote the introduction of HTC for cleaning sector (RUT) and the adoption of the invoicing system in Sweden, and the blue dashed vertical lines denote changes in the household tax credit parameters in Finland

To facilitate the comparison of the two series, we eliminate some of the seasonality that is constant between years from these series by first regressing the month of the year indicator variables (January-December) on sales and inputs, and then plot the firm-level residuals from these regressions. Figure 35 shows the average firm-level residuals of sales regression by country. It is evident that the pre-trends are very similar between the countries, validating our comparison with the cleaning industry.

Figure 35 shows our main result. We observe no change in the reported value of sales by Swedish cleaning industry firms compared to Finnish firms right after the introduction of HTC in July 2007. This means that the introduction of HTC in Sweden did not increase the value of reported sales by cleaning firms. This seems to be the case for two years after the introduction as monthly reported sales in the two countries follow each other very closely

in this period. The result implies no changes in demand for the services, as reported sales do not increase after the introduction of the HTC in Sweden. The result also implies no clear increase in the prices of services, because that would similarly require an increase in the value of sales. Moreover, the result implies no reduction in tax evasion by firms because that would require the reported value of sales to increase. Given that we observe that the usage of HTC is already at a relatively high level in 2008 in Figures 25 and 26, the result finding no effect suggests very low elasticity of demand with respect to prices. That is, consumers do not seem that sensitive to price changes in their demand responses for the services. However, some simultaneous responses could explain this negligible effect on the value of sales, for example producer prices could decrease in response to the reform and be compensated by increased transactions, leaving the value of sales unchanged. In the analysis below, we further examine firms' input usage to study whether transactions really increased as a response to the 2007 reform or not.

Figure 35. Cleaning – firm-level trends in sales relative to June 2007, seasonality adjusted



Note: The left graph plots the development of firm level sales in Sweden and Finland and the right graph plots the difference of Sweden relative to Finland with confidence intervals. The red dashed vertical lines denote the introduction of HTC for cleaning sector (RUT) and the adoption of the invoicing system in Sweden, and the blue dashed vertical lines denote changes in the household tax credit parameters in Finland. Monthly coefficients are from a firm-fixed effect regression of log monthly turnover on month, binary variables relative to June 2007, weighted with firm's average annual market share in 2006–2008. Sales are adjusted to price level of January 2006. The weights are winsorized by 4%.

In July 2009, the Swedish HTC system became an invoice system in which firms directly deduct the HTC from the client's bill and charge the credit to the tax authority. This makes HTC more salient as the buyer of the HTC-eligible services observes the effect immediately in lower cleaning service prices. In principle, it would be interesting to use this variation to study the effects of the HTC invoice system by comparing cleaning industries between countries, but there are three important points that make it challenging to draw causal evidence from this reform. First, the Great Recession starts just before this reform and it may bias the results if industries between countries face this economic downturn

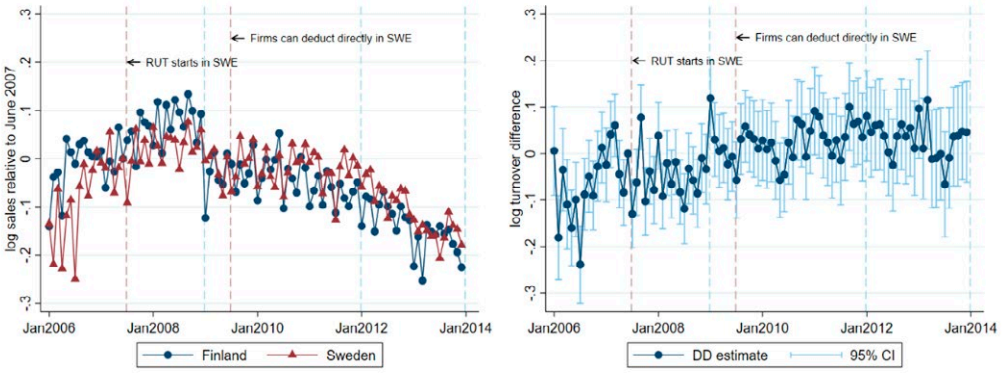
differently. Second, there is an increase in the maximum amount of HTC in the beginning of 2009 in Finland. Third, the reform in Sweden in July 2009 did not change the economic incentives of the HTC system, just the invoicing system, and thus the effects could be hard to interpret.

However, to offer a full disclosure, we next analyze the Swedish 2009 reform also exploiting the evidence in Figure 35. After the adoption of this new system, we do not immediately see any increase in sales in the weighted series, but some difference between the countries, especially from 2010. The most likely explanation for this divergence is that the Great Recession affected Finland and Sweden differently, affecting Finnish firms more over time. In fact, in Figure 35 we see that the development of sales is rather stable over time in Sweden and the divergence in the trends is more due to a decline in Finland than an increase in Sweden. Other explanations for this divergence are that demand for cleaning services increases, consumer prices for services before deducting HTC increase, or the amount of tax evasion decreases. Furthermore, note that in January 2012 Finland decreased both the level of maximum credit (from EUR 3000 to 2000) and the share of labor costs credited against individual-level income taxes (from 60 to 45%), which makes it hard to compare the countries after 2011. Nevertheless, we next try to find evidence that could distinguish between these.

Firms' input usage of is informative of the development of their transactions, because higher levels of sales and transactions should translate into more inputs being used. Figure 36 shows the seasonality-adjusted and weighted development of inputs similarly as previously for sales. The pre-trends before July 2007 are very similar between the countries. Again, we do not observe any response in inputs to the introduction of the HTC in Sweden, in line with the evidence on of the value of sales. Therefore, this also rules out the possibility that the combined response of decreased producer prices and increased volume explains the results above.

Moreover, we do not observe any clear increase in the input series after the 2009 reform in Sweden. Nor do we observe any gradual increase in 2011. Inputs are a commonly used measure to approximate the marginal costs in many firm-level studies and an increase in sales without a concurrent increase in inputs suggests that the increase in sales in not driven by increased quantity of transactions. This suggests that some other channel causes this divergence in reported sales between the countries. In sum, this analysis gives no support for the actual number of transactions having increased even after July 2009 in Sweden, at least when considering the number of transactions at the aggregate level in the economy.

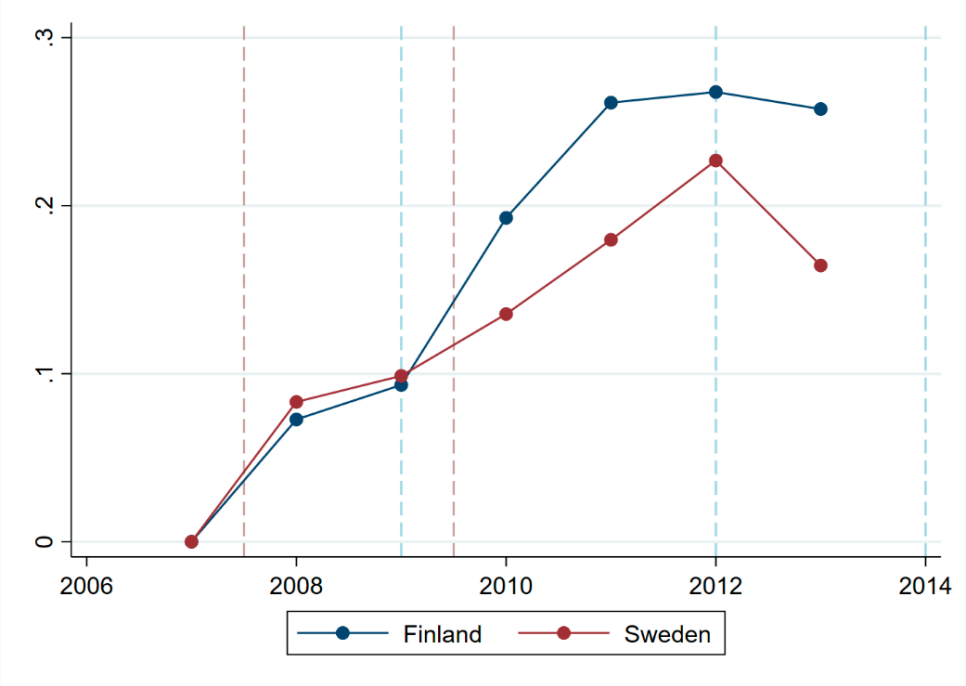
Figure 36. Cleaning – Firm-level trends in input spending relative to June 2007, seasonality adjusted



Note: The left graph plots the development of firm level input spending in Sweden and Finland and the right graph plots the difference of Sweden relative to Finland with confidence intervals. The red dashed vertical lines denote the introduction of HTC for cleaning sector (RUT) and the adoption of the invoicing system in Sweden, and the blue dashed vertical lines denote changes in the household tax credit parameters in Finland. Monthly coefficients are from a firm-fixed effect regression of log monthly material input spending on month, binary variables relative to June 2007. Material input spending refers to input usage for which firms claim VAT deductions. Input spending is adjusted to price level of January 2006 and weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%.

Figure 37 shows the development of the log value of aggregate sales in Finland and Sweden. Notably, in this figure the aggregate value increases more in Finland than in Sweden after 2009. From this evidence we conclude that, if anything, it seems that in this period economic activity has shifted somewhat from larger to smaller firms. In Figure 64 in the Appendix we show evidence supporting this as there is a large increase and strong post-trends among very small firms in Sweden, but a much more modest development among larger firms. However, with our analysis we cannot separate different explanations for this behavior such as the effect of the Great Recession and the potential effects of fiscal stimulus responses to these industries.

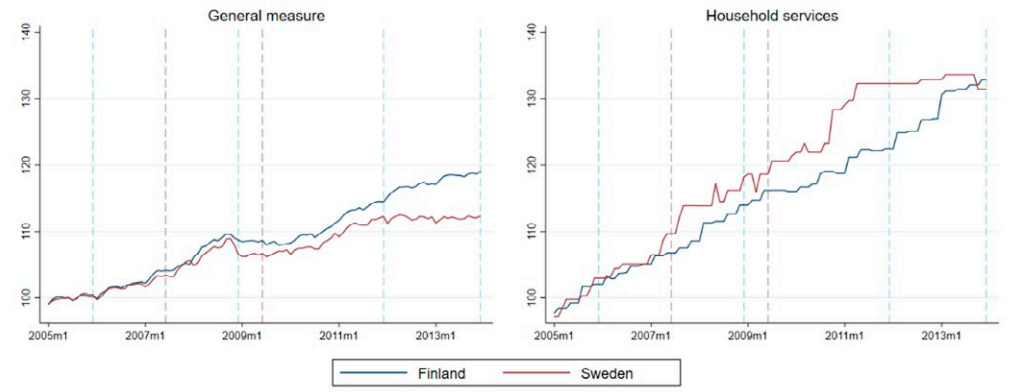
Figure 37. Log difference of aggregate sales in cleaning industry relative to 2007



Note: Sales of firms deflated to 2006 price level. Blue and red vertical lines denote changes in Finnish and Swedish HTC systems respectively.

To illustrate how consumer prices change after the 2009 reform, we show the development of aggregated price levels for cleaning services between the countries. These measures are collected by the statistical offices for the purposes of the consumer price index. The price indices are plotted in the right panel of Figure 38. The left panel of Figure 38 also shows the development of the overall CPI index between the countries. The prices of cleaning services seem to follow each other closely before the introduction of HTC in Sweden in 2007, after which prices in Sweden increase somewhat more than in Finland. The indices diverge even further after the 2009 reform, suggesting that increasing service prices seems to be a relevant explanation for part of the divergence in the value of reported sales. Higher prices mean that the value of sales increases without an increase in the amount of services provided. In sum, we find suggestive evidence that consumer prices might have increased due to this reform, which would also be in line with our earlier results - an increase in the value of sales and no responses in input usage. This evidence indicates that the responses in the quantity of services sold after the 2009 reform are limited, although the above problems are still present and complicate our empirical analysis.

Figure 38. General consumer price index and CPI of household maintenance



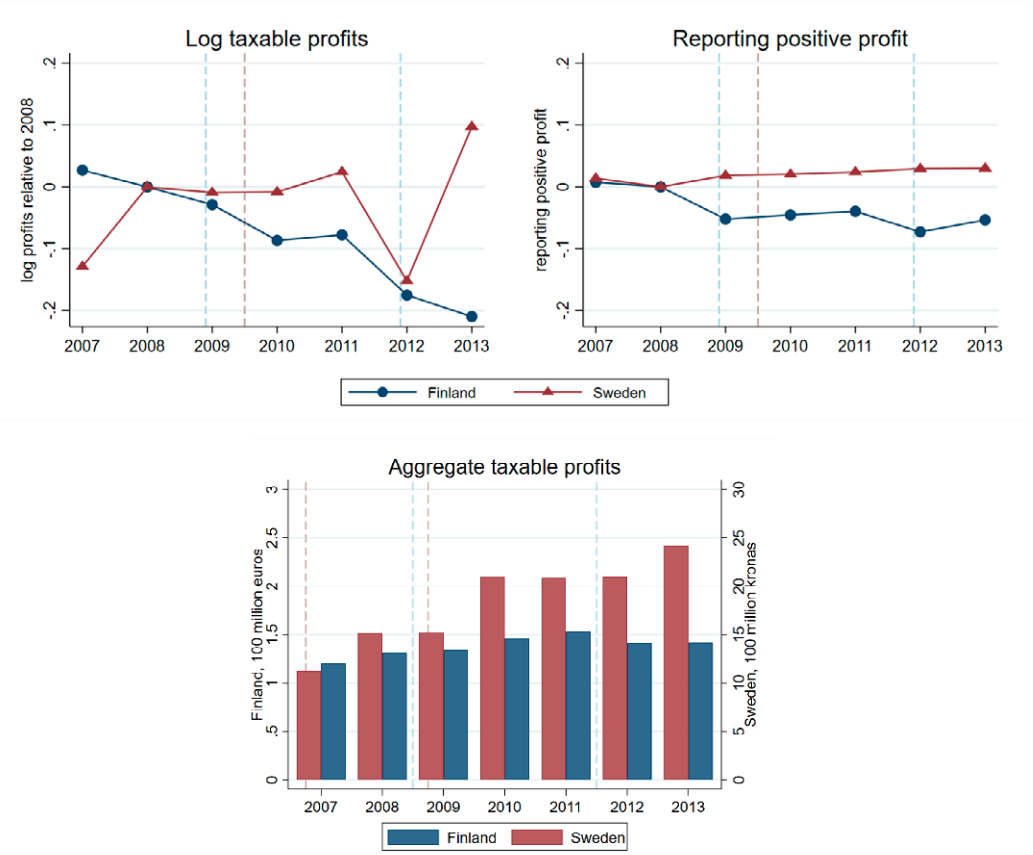
Note: 2005=100. Source: Statistics Finland and Statistics Sweden.

In addition, we study annual tax filing measures such as firm-level taxable annual profits and labor costs. Unfortunately, our annual data are limited to years starting in 2007, therefore, we cannot study how these outcomes responded to the introduction of the HTC. Therefore, we study how profit and labor costs changed after the implementation of the invoicing system in Sweden, and keep in mind that the Great Recession may have caused some of the differences between the countries.

An important point to keep in mind is that firm types are very heterogeneous in the cleaning industry. Therefore, profit and labor cost measures are not identical for all firms. We provide some analysis in the Appendix where the graphs are divided by firm size. For sole proprietors, income from a firm is often mainly distributed as profit, while such firms often do not report any wage costs. On the other hand, for firms organized as corporations reported labor costs may include the wages of the owners themselves[9], and especially for small corporations the owners' wages may represent a large share of the firm's wage costs. Thus, an increase in taxable income after the introduction of HTC in Sweden would offer evidence that firms benefit from the tax credit essentially either in the form of higher profits or other income from the firm to the entrepreneur. However, we have to be cautious in interpreting these results as the above-mentioned challenges make it difficult to do causal inference based on this reform.

9 The owners may want to distribute some of the income as wages instead of dividends for tax purposes.

Figure 39. Cleaning – firm-level trends in annual taxable profits



Note: Upper-left graph plots coefficients from a firm fixed-effect regression of log annual taxable profits on year. Binary year variables capture annual profits relative to 2008. Taxable profit is adjusted to the price level of 2006 and weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. Blue dashed vertical lines denote changes in the tax credit in Finland and red dashed vertical lines denote changes in Sweden. The second figure plots the coefficients from a firm fixed-effect regression of binary variables, with zero indicating reporting positive profits that year. The third graph plots the aggregate nominal profits in the cleaning sectors in Sweden and in Finland. The figure suggests that the firm-level effect also shows at the aggregate level. As a response to the change in the HTC system in Sweden in 2009, firms seem to make significantly more profits.

Figure 39 shows the development of taxable profits among cleaning firms in Sweden and Finland over time. The first panel shows the development of log taxable profits relative to 2008 estimated as firm-level data estimated with firm fixed effects. In this case there are some divergent developments between the countries even before 2009. We do observe some further divergence after 2009, but at this point the evidence points more towards the Great Recession than to other factors. However, note that when using logarithmic transformation for taxable profit, negative and zero profits are not in the analysis. Therefore, in the second panel we plot the firm fixed-effect regression results for an indicator variable of reporting any positive profit over time using a similar approach as for log taxable profits. There seems to be an increase in reporting any positive profit

among Swedish firms compared to Finnish firms. The third panel shows an aggregate-level measure of the two first panels, the sum of all taxable profits in the industry by country. The figure shows that, at the industry level, there is a clear increase in taxable profits in Sweden relative to Finland after the introduction of the invoicing system and the Great Recession. Note that the last figure includes all firms in the industry, not just firms that provide HTC-eligible services.

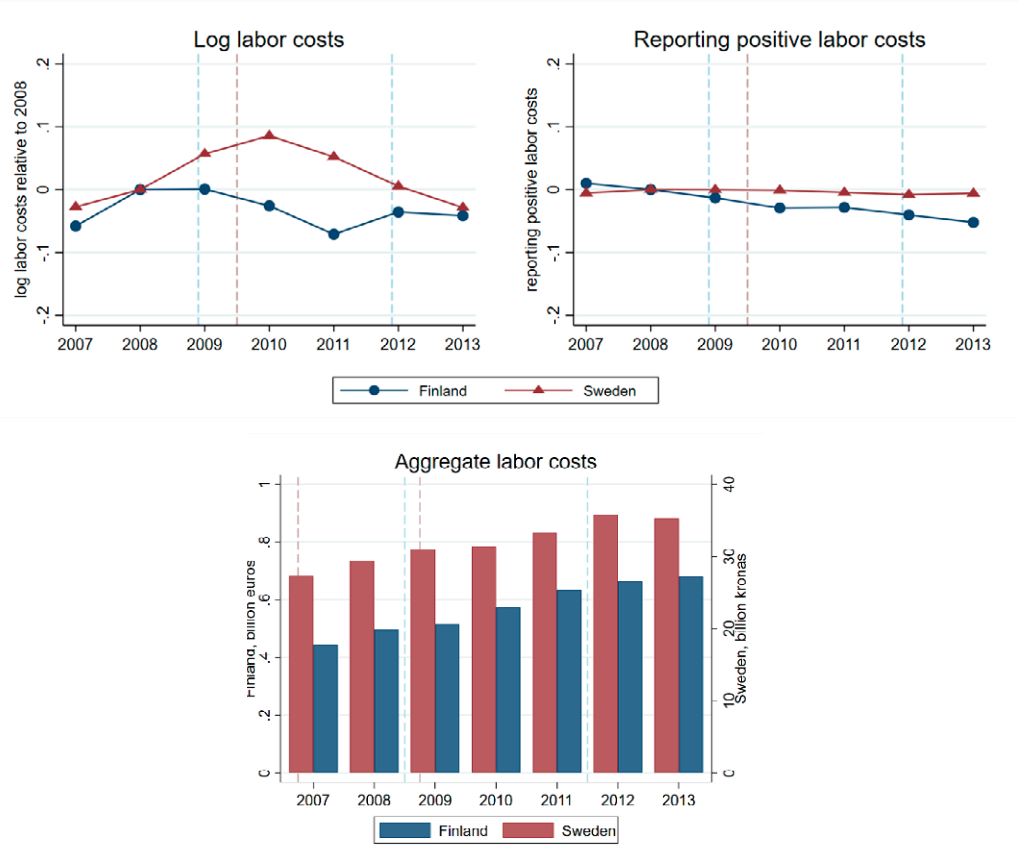
Furthermore, we study the effects on firm-level annual reported labor costs. If labor costs, which are a product of the wage rate and aggregate working hours, increase after the introduction of HTC in Sweden, it could be due to the Great Recession or three other factors: (1) employees' wages increase, (2) the number of working hours of all employees increases, or (3) owners' wages increase. The first mechanism would indicate that firms share some of the increased profit margin with their employees. The second mechanism implies that employment increases. The third mechanism would indicate no changes in employment or employees' wages, rather some business owners preferring to pay part of the increased profitability as wages instead of capital income for tax purposes[10]. We cannot directly observe the number of working hours within firms, and therefore it is not possible to give a definite answer to the contribution of each channel. However, we observe total labor costs at the firm level, which includes all these potential explanations.

Figure 40 shows the development of annual labor costs. We find that the trends in log labor costs relative to 2008 in Finnish and Swedish firms are somewhat similar before 2009. We find an increase in labor costs after 2009 among Swedish firms compared to Finnish cleaning industry firms. As a large fraction of firms in the cleaning service industry are sole proprietors, many of these small businesses do not even report labor costs as they receive their taxable income as profit. Thus, in the second panel we plot the firm fixed-effect regression results with a binary variable denoting reporting any positive labor costs as a dependent variable. The figure shows quite limited effects. Finally, the third panel plots the aggregate nominal labor costs in the cleaning sectors in Sweden and Finland. The figure suggests that while at the firm level there are positive effects, at the aggregate level the effect on labor costs of the HTC change to an invoicing system is modest given the preceding positive trend in both countries. This indicates that the positive effects are driven mostly by very small firms, but at the industry level the effects are relatively small. Also, the issues related to the use of this reform as a source of causal analysis are still present and we do not want to push these results too far. It is perfectly possible, for example, that these different trends are due to the negative effects of the Great Recession in Finland or some firm owners being able to profit more from their firms.[11] However, unfortunately, we cannot distinguish these different confounding factors from each other.

10 There are a lot of small firms in the cleaning industry, especially in Sweden, making the role of the owner particularly relevant (Fig. 9).

11 Figures 51-55 in the Appendix also show our main outcome variables by firm size and show the important role of small firms in driving our results.

Figure 40. Cleaning – firm-level trends in annual labor costs



Note: First graph plots coefficients from a firm-fixed effect regression of log annual labor costs on year. Binary year variables capture annual labor costs relative to 2008. Labor costs are adjusted to the price level of 2006 and weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. Blue dashed vertical lines denote changes in the tax credit in Finland and red dashed vertical lines denote changes in Sweden. The second figure plots the coefficients from a firm-fixed effect regression of a binary variable with zero indicating reporting positive labor costs that year. While not reporting labor costs is common as there are many small sole-proprietor businesses, more firms have started to report labor costs after 2009. The third graph plots aggregate nominal labor costs in the cleaning sector in Sweden and Finland. The figure suggests that while at the firm level there are positive effects driven by small firms, on the aggregate level the effect of the reform on labor costs is modest given the preceding positive trend in both countries.

Finally, we report the main regression estimates using the difference-in-differences approach described in Section 3. Tables 19 and 20 report the regression results estimated following equation 1. Table 19 shows the results for sales and inputs with three different specifications. As we do not want to include additional reforms in the period studied, we limit the data to the end of 2011. For sales or input usage, there is no significant response to the introduction of the HTC system in Sweden in July 2007, consistent with the graphical evidence above. For the introduction of the invoicing system in 2009 we find only weakly statistically significant positive coefficients that are not very robust, mainly reflecting increases from 2010 onwards, which, as we analyzed above, most likely reflect the Great Recession more than the effects of the 2009 reform.

Table 19. Difference-in-differences results for cleaning industry – reforms in Sweden

	Sales			Inputs		
	(1)	(2)	(3)	(1)	(2)	(3)
1st reform estimate	0.006	-0.024	-0.017	0.041*	0.009	0.023
	0.016	0.014	0.014	0.021	0.019	0.018
2nd reform estimate	0.109***	0.041	0.049*	0.117***	0.055	0.076**
	0.027	0.023	0.023	0.032	0.028	0.027
Firm fixed effects	X	X	X	X	X	X
Time fixed effects	X	X	X	X	X	X
Weighted	X	X	X	X	X	X
Pre-trend controlled	X	X	X	X	X	X
Winsorized data		X	X		X	X
Seasonality adjusted			X			X
Constant	11.294***	11.198***	1.851***	9.659***	9.576***	1.907***
	0.018	0.016	0.015	0.022	0.020	0.019
N	464809	464809	451239	457422	457422	444408

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports difference-in-differences estimation results of the 2007 and 2009 reforms in Sweden for the cleaning industry. All specifications are weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. 1st reform refers to the introduction of the HTC for cleaning services and the second reform refers to the change to an invoicing system in which firms claim the credit on behalf of their customers (no change in parameters). The first three columns report results for sales with different specifications and the second three columns report results for material input usage. The first specification includes firm and year fixed effects, the second specification additionally uses data winsorized at the 1-percentage-point level and the third specification is adjusted for monthly seasonality.

Table 20 reports the estimation results for profit and labor costs before and after the 2009 reform. Due to data limitations in the annual variables we cannot study the first reform with the regression analysis. As the reform took place in the middle of the year, we also exclude the reform year from the data. The last year included in the estimation is 2011 so as to avoid the 2012 reform in Finland affecting the results and to consider the differential macro trends in the countries' service sectors after 2012. Both profit and labor costs show positive coefficients, but these are not very precisely estimated. The point estimates are

positive, but again only weakly statistically significant. Most consistently, the extensive margin responses are statistically significant, suggesting that after the 2009 reform in Sweden firms start to report positive taxable income and labor costs more than Finnish firms. Note again that drawing causal inferences based on these results is challenging due to the problems related to the Great Depression, the simultaneous reform in Finland in the beginning of 2009 and non-existent incentive changes in the reform of 2009 in Sweden.

Table 20. Difference-in-differences results for annual profit and labor costs of cleaning firms – 2009 reform in Sweden

	Profit			Labor costs		
	(1)	(2)	(3) Extensive margin	(1)	(2)	(3) Extensive margin
2nd reform estimate	0.109	0.082	0.065***	0.130*	0.120*	0.027***
	0.076	0.065	0.015	0.054	0.051	0.006
Firm fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Weighted	X	X	X	X	X	X
Winsorized data		X			X	
Seasonality adjusted						
Constant	41.564	95.053	1.011	78.918	239.070	0.872
	.	23656263.447	453562.934	55339836.413	85334128.796	.
N	18924	18924	23502	12923	12923	23502
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

Note: This table reports difference-in-differences estimation results of the 2009 reform in Sweden for the cleaning industry. All specifications are weighted by firm-level market shares in 2006-2008. These weights are winsorized by 4%. 1st reform refers to the introduction of the HTC for cleaning services and the second reform refers to the change to the invoicing system in which firms claim the credit on behalf of their customers (no change in parameters). The first three columns report results for sales with different specifications and the second three columns report results for material input usage. The first specification includes firm effects and the second specification additionally uses data winsorized at the 1-percentage-point level.

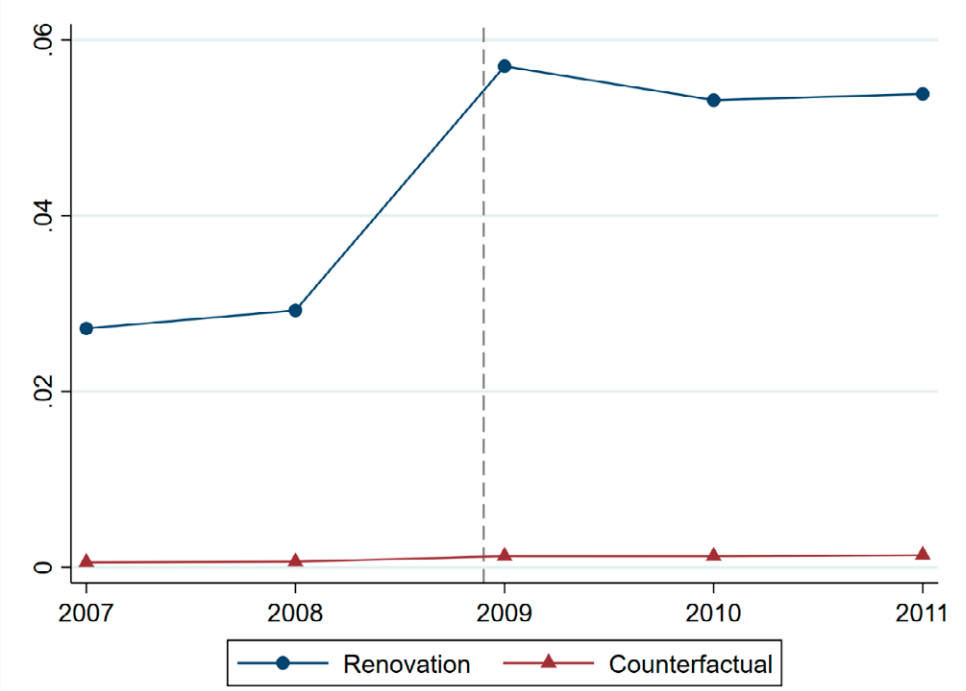
5.2 Renovation

In this section, we study how Finnish renovation firms respond to the increase in the maximum amount of HTC from EUR 1150 to 3000 in 2009. In Section 4.3 we argued that, while the cleaning industry had evolved similarly in Finland and Sweden over this period, the trends in renovation were notably different due to the Great Recession treating the two countries differently. Therefore, we use a different approach for renovation than for the cleaning industry, and construct a domestic control group for the Finnish renovation industry using firms from industries providing services broadly similar to those of the renovation industry. The treated industries include building, flooring, roofing and installation services etc. We choose automotive retail and repair and logistics as our control industries as they are relatively similar in terms of size and cyclicality to the renovation industry, but these firms do not provide services that could be used to claim HTC.[12] Then we use coarsened exact matching to select firms into control and treatment groups and give them weights that are used in the subsequent analysis. The parameters we use for CEM-matching are annual sales, sales growth in the previous year and labor costs. The CEM-matching method and the empirical approach are discussed in more detail in Section 3.3.

We study the effects of HTC using as a variation the increase in the maximum amount of credit for renovation services from EUR 1150 to 3000 in January 2009. This change is the biggest single increase there has been in the Finnish system. Therefore, we argue that such a large increase is least likely to go unnoticed and should have an impact on demand and employment if the HTC is effective in that regard. The reform did not change the deductible share of 60% for renovation services or for other industries.

12 The treated and control industries are listed in Tables 23 and 24 in the Appendix.

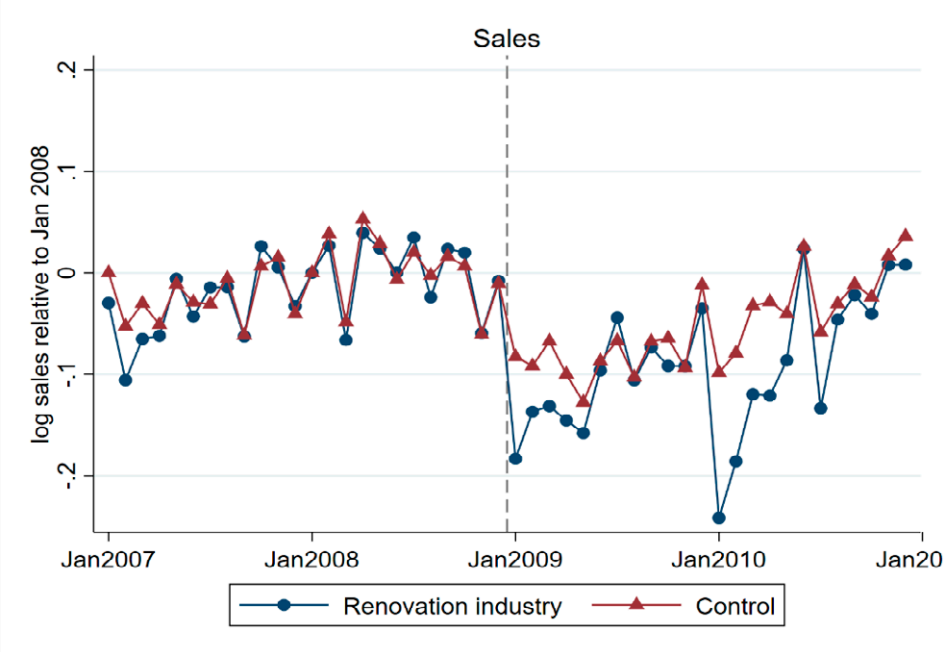
Figure 41. Renovation – HTC share of sales in treatment and control groups in micro-level data



Note: This figure plots coefficients denoting the HTC share of a firm's total labor costs, estimated with a CEM-weighted firm-fixed effect regression and 2008 as the baseline year. The dashed vertical line depicts the increase in the tax credit starting in 2009. The figure shows that, after the increase in the maximum tax credit, the HTC claimed increases in relation to labor costs.

In Figure 40, we examine how the share of HTC claims of total sales develops around the reform between the renovation and control firms. We use information from individual HTC claims and allocate these for each firm. We then sum up these HTC's at the firm-year level and calculate how large this share of total firm-level annual sales is. This share is plotted in Figure 40 from 2007 to 2011. The figure shows clearly that after the increase in the maximum tax credit in 2009, the claimed HTC share increases in the renovation firms. There is no similar increase in the control group, providing evidence supporting our empirical approach. However, the increase in tax credit claims does not necessarily imply higher consumption of these services, rather that taxpayers are using the tax credit more than before for services that they might have consumed in any case. Next, we study how the HTC increase affects consumption of these services by studying firm-level reported value of sales and inputs as we did for the cleaning industry above.

Figure 42. Renovation – Sales, seasonality adjusted in the micro-level data



Note: Coefficients from a firm-fixed effect regression of log monthly sales on month, dummies relative to January 2008. The monthly sales are reported by firms in their VAT filings.

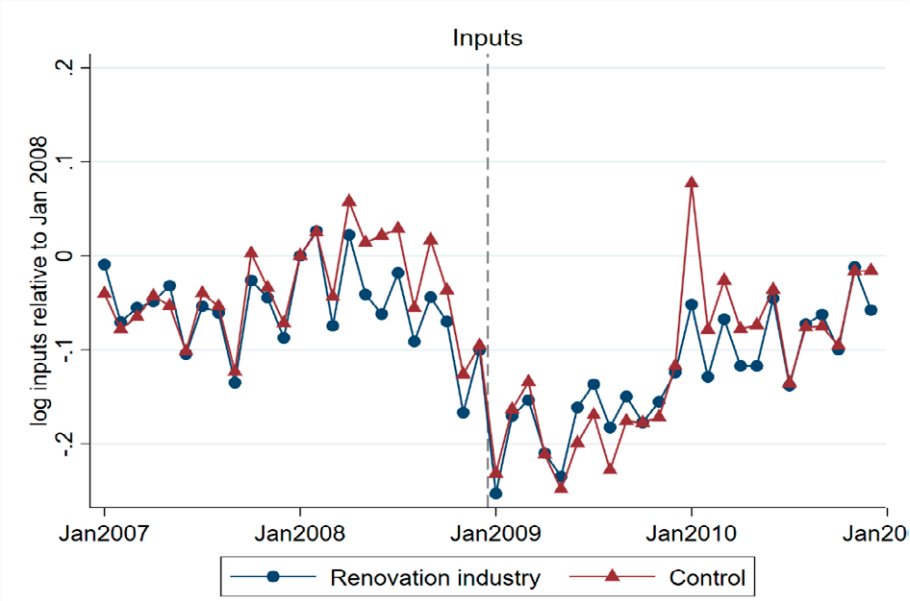
Figure 41 plots the development of the monthly sales of renovation firms and the control group relative to January 2008. The figure shows the monthly sales relative to January 2008 separately for both groups. The figure shows that the trends before the tax credit change are parallel, providing support for our identification strategy[13]. After the HTC change, the trends develop very similarly. If the increase in HTC were to have a positive effect on sales in renovation firms, it should manifest here as increased sales relative to the control group despite the falling trend in both groups. In addition, if the change were to have a negative effect on tax evasion, there should also be an increase in VAT-reported sales in comparison to the control group. However, we observe no increase in the sales of renovation firms - if anything there is a decrease in the renovation sector compared to the control group after January 2009.

In Figure 42 we plot the same regression results for material input usage. The trends before 2009 again seem very parallel, validating our set-up. There is no differential increase after the change in HTC, in line with the earlier figure showing no increase in the sales of renovation services relative to the control group. This further suggests that there is no

13 Also, we do a so-called placebo treatment analysis assuming that the reform would have taken place in January 2008 and obtain a diff-in-diff estimate of 0.000 (0.004) suggesting that the pre-trends are aligned. We perform the same placebo test for inputs and obtain an estimate of 0.026 (0.005).

increase in consumption of these services. This also rules out the explanation of combined effects of a simultaneous reduction in producer prices and an increase in transactions. Furthermore, Figure 43 plots annual effects of profit and labor costs respectively relative to 2008. Also, these outcomes suggest that there are no strong responses to the large increase in the household tax credit.

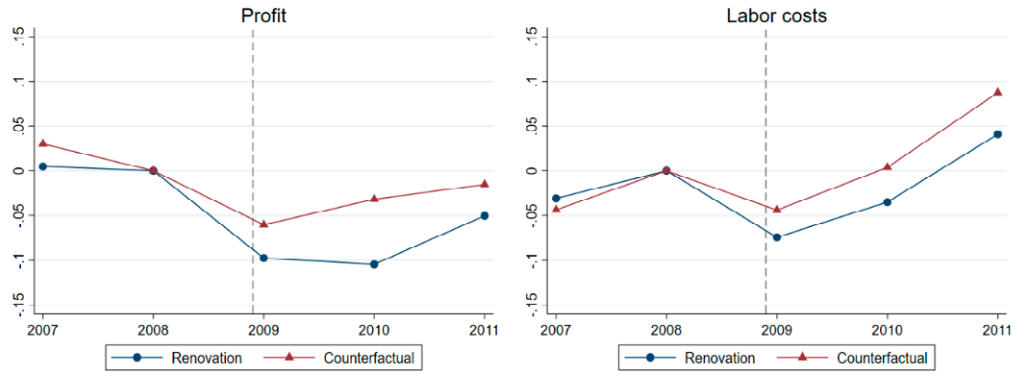
Figure 43. Renovation micro trends –Inputs, seasonality adjusted



Note: Coefficients from a firm-fixed effect regression of log monthly inputs on month, dummies relative to January 2008. The monthly sales are reported by firms in their VAT filings.

Tables 21 and 22 report the difference-in-differences results for the 2009 HTC increase. Figures 41 - 43 already suggested that there is no evident increase in firms' sales, material input usage, profits or labor costs. The evidence in Section 4.3 showed that there is no notable increase in the number of firms either. Therefore, we conclude that there is no increase in sales or in other outcomes, implying that there is no increase in the consumption of services or in employment in the renovation industry compared to matched control industries. If the increase in HTC were to lead to less tax evasion, this would also show as an increase in sales reported in VAT filings. As there is no increase in sales, the results suggest no significant effect on tax evasion either. In sum, the analysis in this section shows that we were not able to find any effect from the increase in the maximum amount of HTC on the number of services sold by renovation firms or tax evasion by them. We need to interpret these results with some caution because, after all, the economic conditions were not very stable during this period, and this may have affected industries differently.

Figure 44. Renovation micro trends – Annual taxable profit and labor costs



Note: Coefficients from a firm-fixed effect regression of log annual profits/labor costs on year. Year effects are relative to 2008. The dashed vertical line denotes the change in the tax credit in 2009.

Table 21. Difference-in-differences results for renovation industry – 2009 reform in Finland

	Turnover			Inputs		
	(1)	(2)	(3)	(4)	(5)	(6)
Diff-in-diff estimate	-0.092***	-0.090***	-0.089***	-0.011	-0.012*	0.001
	0.005	0.005	0.005	0.006	0.006	0.005
Firm fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Winsorized data		X	X		X	X
Seasonality adjusted			X			X
Constant	9.079***	9.075***	0.060***	7.734***	7.725***	0.215***
	0.005	0.005	0.005	0.006	0.006	0.006
N	2914077	2914077	2914077	3114970	3114970	2851982

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports the CEM-weighted difference-in-differences estimation results for studying the effect of the HTC increase in 2009 on sales and inputs. The first three columns report the estimation results for sales and columns 4 to 6 for material input usage. All specifications use firm and year fixed effects as well as CEM weights. The second specification for both dependent variables uses data winsorized at the 2.5-percentage-point level and the third specification uses data that is additionally adjusted for monthly seasonality.

Table 22. Difference-in-differences results for annual profit and labor costs of renovation firms – 2009 reform in Finland

	Profit		Labor costs	
	(1)	(2)	(3)	(4)
Diff-in-diff estimate	-0.030	-0.033**	-0.043***	-0.043***
	0.010	0.009	0.010	0.009
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Winsorized data		X		X
Seasonality adjusted				
Constant	9.821***	9.829***	10.586***	10.583***
	0.004	0.004	0.003	0.003
N	235796	235796	167287	167287
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$				

Note: This table reports difference-in-differences estimation results for studying the effect of the HTC increase in 2009 on taxable profit and labor costs. The first two columns report the estimation results for sales and columns 3 and 4 for labor costs. All specifications use firm and year fixed effects as well as CEM weights. The second specification for both dependent variables uses data winsorized at the 1-percentage-point level.

To sum up, we do not find any evidence to confirm that the increase in the maximum amount of HTC increased demand for renovation services in Finland. These results seem to be consistent whether using the firm-level value of sales or inputs as a measure for consumption. Also, the results for profits and labor costs lend support to this conclusion. However, we need to be cautious in interpreting these results as, after all, the economic conditions were not very stable during this period, and this may have affected renovation and selected control industries differently.

6 Conclusions

In this study we have described consumption patterns for household services, the usage of household tax credit (HTC) for these, and, using several reforms to the HTC systems in Finland and Sweden, studied to what extent HTC could increase consumption of services.

Consumption patterns revealed that although the consumption of household services has been steadily increasing over time, in any given year only a fifth of all working age individuals use either cleaning, renovation or care services. We also showed that on average high-income individuals utilize the HTC much more than low-income individuals. One reason for this seems to be that low-income households do not consume these types of services. Another reason could be that as the HTC is credited against income taxes, low-income households have less taxes than higher-income households against which to credit HTC. This pattern of HTC usage relative to household income is much stronger than, for example, similar statistics for reduced VAT rates on groceries or restaurant services (Riihelä, 2010).

Moreover, we found that many taxpayers are not aware of the HTC rules. This was visible in the administrative data as many individuals make apparent mistakes in claiming the HTC. This is also supported by the results from our survey, where we asked about knowledge of the HTC details. Therefore, there are clear information concerns related to the HTC system as individuals do not seem to understand or know the details. If individuals are not aware of the details and changes in them, this also has implications for how the HTC affects consumption of these services, and therefore also for employment in these services sectors.

The results on the impact of HTC on the consumption of services or firms' reported sales showed very limited effects. Our strongest evidence comes from the introduction of HTC in Sweden in 2007 for cleaning services. We use Finland as a control group and show that the comparison is valid in terms of stable economic conditions surrounding the reform and the two groups developing similarly over time before the reform. Despite the high level of HTC and the fact that many individuals and firms indeed use it, we find no evidence that HTC increases the reported value of firms' sales or inputs. This result gives no support for HTC leading to increased consumption of cleaning services by households, or of decreased tax evasion by firms. We also analyze the change in the invoicing system from consumers to firms in Sweden in 2009 and an increase in the maximum amount of HTC in the renovation industry in Finland in 2009 from EUR 1150 to 3000. Both analyses are slightly sensitive to the Great Recession that starts to affect Finland and Sweden in 2009, potentially creating differential trends between the countries and industries unrelated to HTC. Nevertheless, the evidence we present is consistent with the 2007 Swedish reform

showing no clear increase in the amount of services provided to household due to changes in HTC.

A common view often stated in the public discussion is that HTC is very effective in creating employment by increasing the consumption of household services. However, many previous studies that have examined policies closely related to HTC, such as reduced VAT rate experiments for labor-intensive services, find virtually no effect on the consumption of services or employment in the industries (Kosonen 2015, Harju et al. 2018 and Benzarti et al. 2020). These earlier results, together with those in this report, suggest that the elasticity of demand with respect to prices for services is rather small. This low elasticity implies that consumers are not very sensitive to prices in their consumption choices for these types of services.

Second, the impact of HTC on prices may not be as salient for consumers as a reduction in VAT would be, because the latter directly affects the prices consumers pay. In contrast, in the Finnish HTC system, consumers need to first pay the price of the service and then later receive the tax credit in their income taxes, which are not directly related to the price of service. For consumers to understand the impact on prices, they need to know the HTC rules. Our survey revealed that many individuals do not know the details of the HTC rules very well. Our analysis of the administrative data on usage of services also revealed mistakes in HTC claiming. The results show that a large share of consumers is not able to calculate the effective post-HTC price, further dampening the incentive effect of HTC and in turn reducing any changes in consumption patterns.

This still begs the question why there is a popular belief that HTC is very effective in creating employment. There is a gradual rise in the household cleaning sector in both countries, as observed in Section 4.3. This seems to follow from pre-existing trends driven by increasing income, a global trend towards an expanding service economy, urbanization or other mechanisms. These increasing trends occur at the same time as the introduction of the HTC policies, which may partly be the reason for why individuals perceive that HTC causes increased consumption, whereas it is just a question of spurious pre-existing trends. Our survey shows that only one fifth of all households consume household services, which hinders the effectiveness of HTC policies in increasing aggregate national employment. The survey also shows that individuals tend to believe, for example, that reducing the maximum amount of HTC would reduce their consumption, but the causal results with administrative data indicate that they tend not to do so when facing an actual change in policy. This survey result implies that individual-level subjective beliefs of the impact of HTC might not translate into what individuals do when facing a change in HTC policy.

The other main aim of HTC policies is to reduce tax evasion. This is based on the idea that the tax credit incentivizes customers to require receipts for their payments and report them to the tax authorities to claim tax credit. Note that a reduction in tax evasion could occur even in the absence of any real changes in consumption, with consumers requiring firms to provide the necessary receipts for the transactions. However, as our results are for firms' reported sales, this outcome also includes tax evasion. If tax evasion were to decrease, reported sales would increase. However, we did not observe any increase in reported sales. This result is particularly strong for cleaning services. We find no indication of such effects for renovation services either, but given that the analysis suffers from a simultaneously occurring economic downturn, the result leaves room for some negligible reduction in tax evasion. In addition, our survey provides support for the notion that tax evasion is not perhaps as extensive as thought, because not many respondents were aware of tax evasion by their acquaintances.

To sum up, HTC policies seem largely ineffective in achieving their stated objectives. They do not increase demand for services, increase employment in labor-intensive services or reduce tax evasion to a significant extent. Thus, the benefits of HTC are limited.

Finally, the HTC is a relatively costly tax credit with an annual income tax loss of over EUR 400 million in Finland. Thus, according to our results, a cost-benefit analysis of HTC seems to be negative. Moreover, although HTC is an income transfer, it does not seem to be targeted in line with the optimal income tax literature. This literature suggests that an optimal income tax system is progressive, while the HTC system is clearly regressive, as noted above. However, the overall distributional impact of HTC for the tax system is limited given that HTC is a small share of total taxation.

Appendix

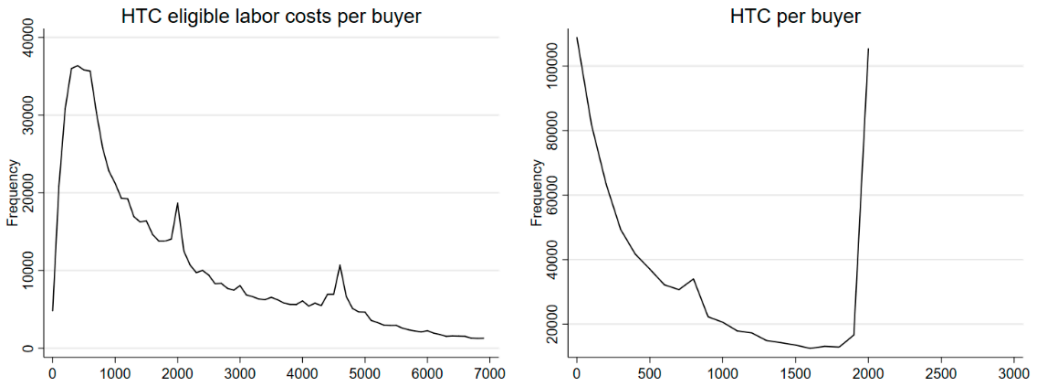
Table 23. Renovation industries studied in Section 5.2:

31020 – Manufacturing of kitchen furniture
41200 – Building
43210 – Electrical work
43220 – Heating, plumbing, AC
43320 – Carpenter
43330 – Floor and wall work
43341 – Painting
43342 – Glazing
43910 – Roofing
47523 – Kitchen retail
47596 – Locksmith's work, security systems

Table 24. Control industries for renovation in Section 5.2:

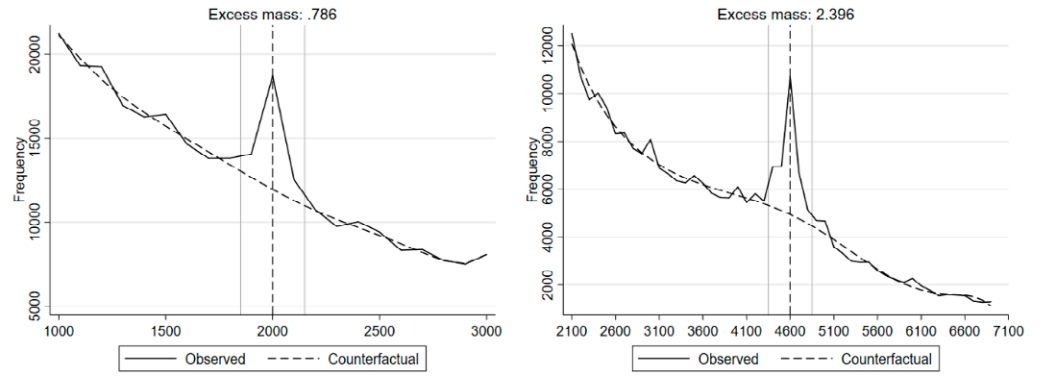
36	Water cleaning and distribution
49	Ground transport
50	Water transport
51	Air transport
52	Storage and transport services
4511	Car and motorcycle retail
45201	Motor vehicle repairs

Figure 45. Distribution of HTC claims 2012–2013



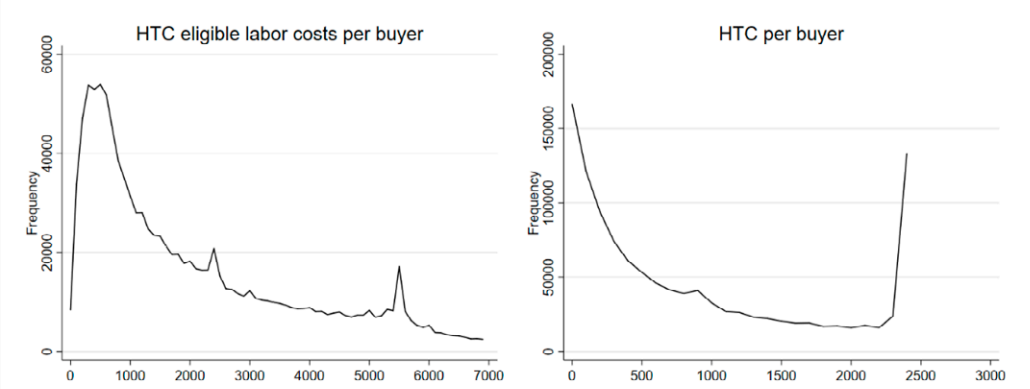
Note: The left figure plots the distribution of HTC-eligible labor costs as a share of total claims (including all services consumed that year) in 2012–2013 when the maximum credit was EUR 2000 and the minimum labor costs to receive that were EUR 4666.66. The horizontal line depicts the amount of labor costs in the claim and the vertical line the number of taxpayers within each 100-euro category. The right figure plots the distribution of granted household tax credits with the size of the HTC on the horizontal line and the number of taxpayers within each 100-euro category on the vertical line.

Figure 46. Frequency of HTC claims 2012–2013



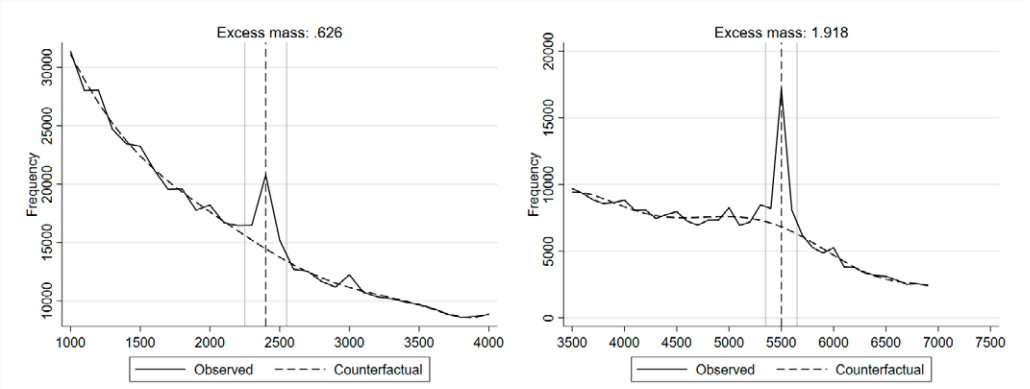
Note: The left figure depicts bunching at EUR 2000 of labor costs and the right figure bunching at EUR 4666.66. In order to claim the full credit, labor costs need to be at least EUR 4666.66. The excess mass estimate is calculated in comparison to the counterfactual distribution, which is estimated as a seventh-degree polynomial when excluding the bunching regions denoted with the grey vertical lines.

Figure 47. Distribution of HTC claims 2014–2016



Note: The left figure plots the distribution of HTC-eligible labor costs as a share of total claims (including all services consumed that year) in 2014--2016 when the maximum credit was EUR 2400 and the minimum labor costs to receive that were EUR 5555.55. The horizontal line depicts the amount of labor costs in the claim and the vertical line the number of taxpayers within each 100-euro category. The right figure plots the distribution of granted household tax credits with the size of the HTC on the horizontal line and the number of taxpayers within each 100-euro category on the vertical line.

Figure 48. Frequency of HTC claims in 2014–2016



Note: The left figure depicts bunching at EUR 2400 of labor costs and the right figure bunching at EUR 5555.55. In order to claim the full credit, labor costs need to be at least EUR 5555.55. The excess mass estimate is calculated in comparison to the counterfactual distribution, which is estimated as a seventh-degree polynomial when excluding the bunching regions denoted with the grey vertical lines.

Table 25. Summary statistics of renovation firms in Finland and Sweden

2008

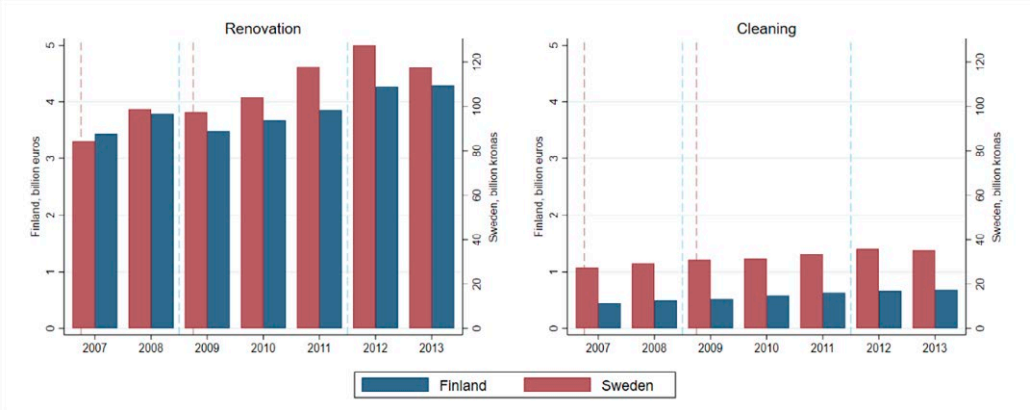
	FIN - All mean	sd	FIN - HTC mean	sd	SWE - All mean	sd
Sales	560,320	9,117,013	700,798	12,070,470	8,964,286	246,134,779
Inputs	313,544	6,130,713	406,709	7,945,743	4,470,078	110,604,155
Labor costs	100,509	1,327,300	131,606	1,798,994	3,500,462	70,969,339
Profit	43,994	265,999	47,094	249,245	412,677	2,538,188
Deducted VAT	68,980	1,348,757	89,476	1,748,063	1,117,520	27,651,039
HTC per firm	2303	13,362	4732	18,852	449	13,139
Observations	43,026		20,939		48,846	

2011

	FIN - All mean	sd	FIN - HTC mean	sd	SWE - All mean	sd	SWE - HTC firms mean	sd
Sales	553,592	10,255,589	681,274	12,320,895	7,357,937	208,316,451	7,191,473	192,935,034
Inputs	301,284	6,440,975	431,819	8,729,579	3,919,009	103,918,993	4,244,896	113,620,980
Labor costs	96,536	1,234,532	122,593	1,592,009	3,014,089	52,771,423	3,123,457	55,915,891
Profit	38,174	425,052	37,791	221,798	411,400	6,575,191	364,249	1,287,922
Deducted VAT	69,295	1,481,424	99,318	2,007,803	979,752	25,979,748	1,061,224	28,405,245
HTC per firm	5503	32,193	10,253	43,387	109,038	461,526	264,056	689,139
Observations	46,178		24,783		68,764		28,395	

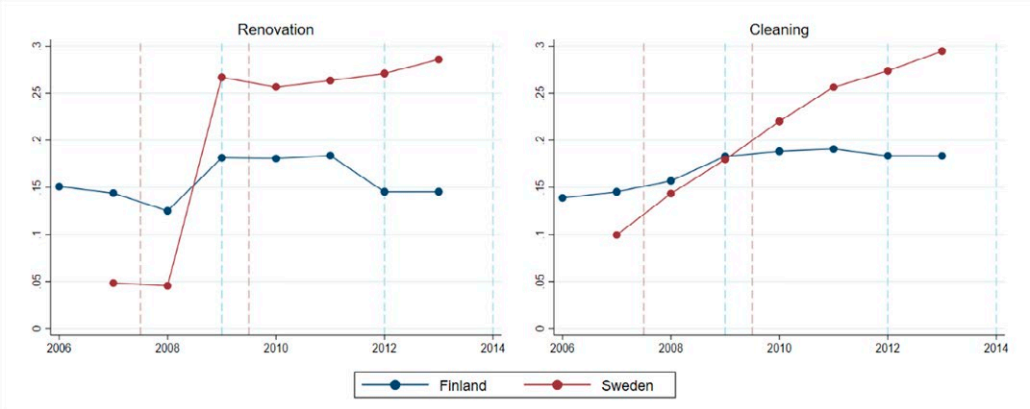
Note: This table provides summary statistics for renovation firms in Finland and Sweden in 2008 and in 2011. Sales refer to sales reported in tax returns and Sales (VAT) refers to sales reported in VAT filings. Inputs consists of material inputs such as materials and intermediate goods. Labor costs includes payroll taxes and other non-wage costs. Profit refers to taxable profit reported in tax returns and deducted VAT to aggregate VAT deduction claims for the year. HTC per firm is calculated by assigning HTC claims to each firm based on the firm ID reported in customers' tax returns

Figure 49. Aggregate labor costs in renovation and cleaning industries in Finland and Sweden



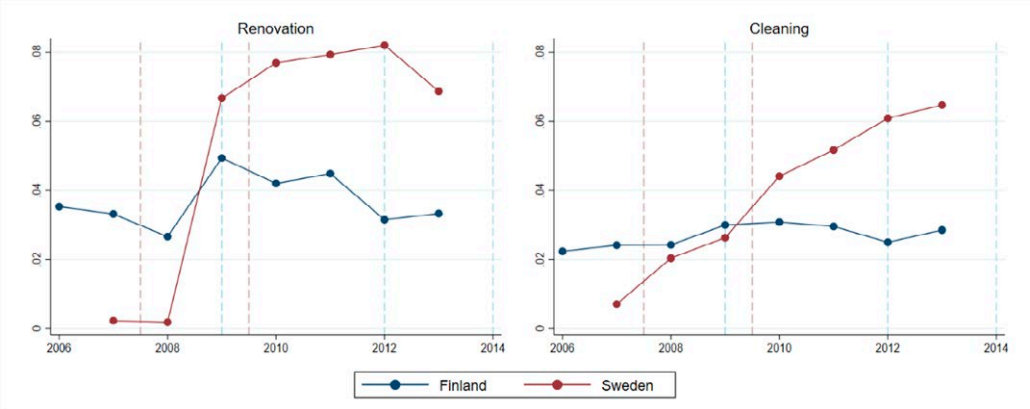
Note: This figure plots nominal aggregate labor costs in the renovation and cleaning industries in Finland and Sweden.

Figure 50. Mean HTC share of labor costs, only firms that sold services for which HTC was claimed



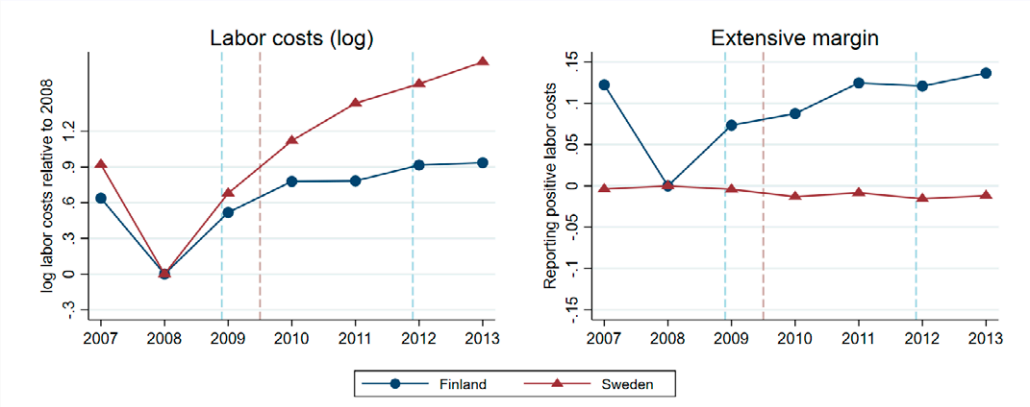
Note: Unweighted mean of HTC relative to labor costs within HTC industry. Blue and red vertical lines denote changes in Finnish and Swedish HTC systems respectively.

Figure 51. Weighted mean HTC share of labor costs within HTC industry (Weight = market share), only firms that sold services for which HTC was claimed



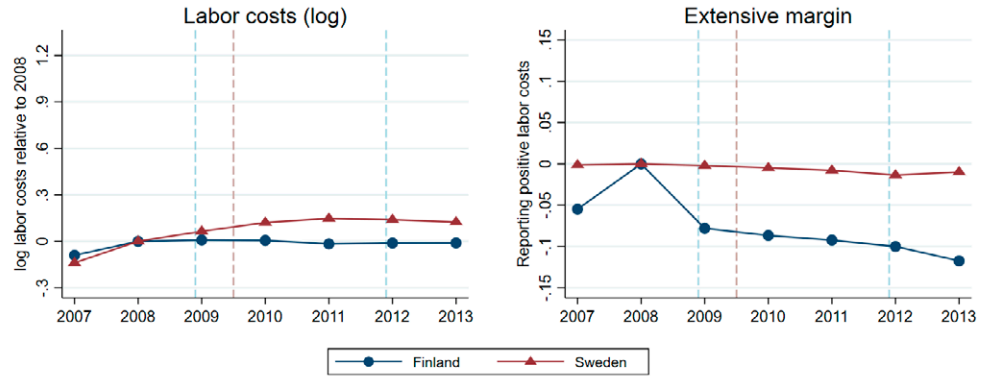
Note: Weighted mean of HTC relative to labor costs within HTC industry, with market share of sales as weight. Blue and red vertical lines denote changes in Finnish and Swedish HTC systems respectively.

Figure 52. Labor costs of firms with sales under 30,000 euros in 2008



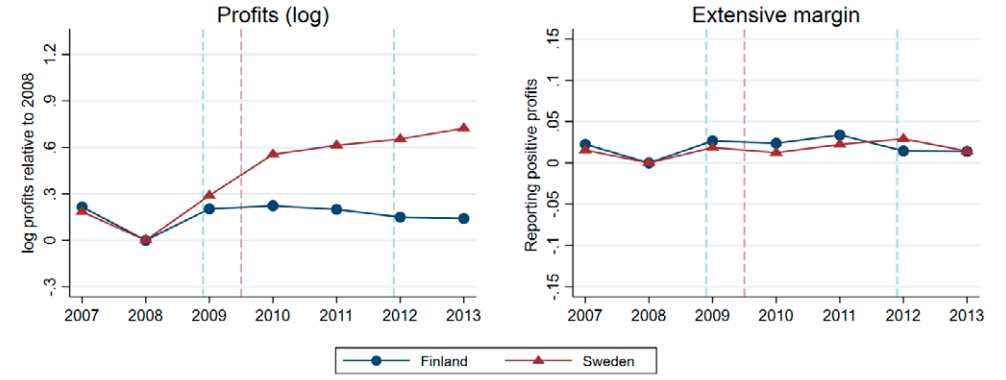
Note: Development of labor costs of firms with sales under EUR 30,000 in 2008, estimated with firm fixed-effect regressions.

Figure 53. Labor costs of firms with sales above EUR 30,000 in 2008



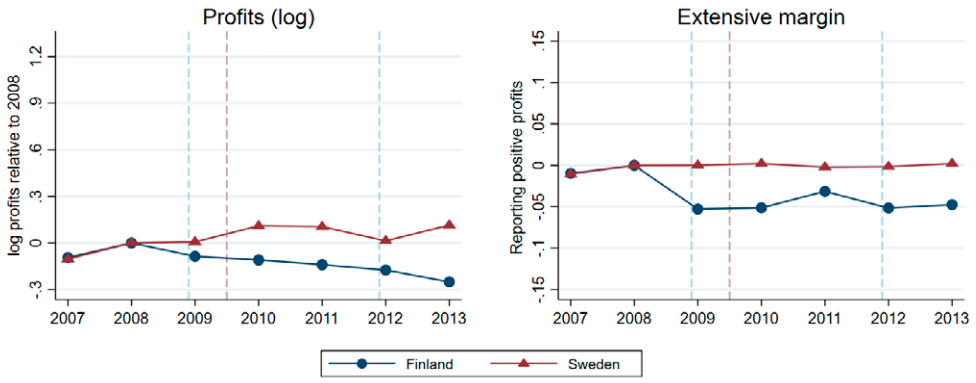
Note: Development of labor costs of firms with sales above EUR 30,000 in 2008, estimated with firm fixed-effect regressions.

Figure 54. Profits of firms with sales under EUR 30,000 in 2008



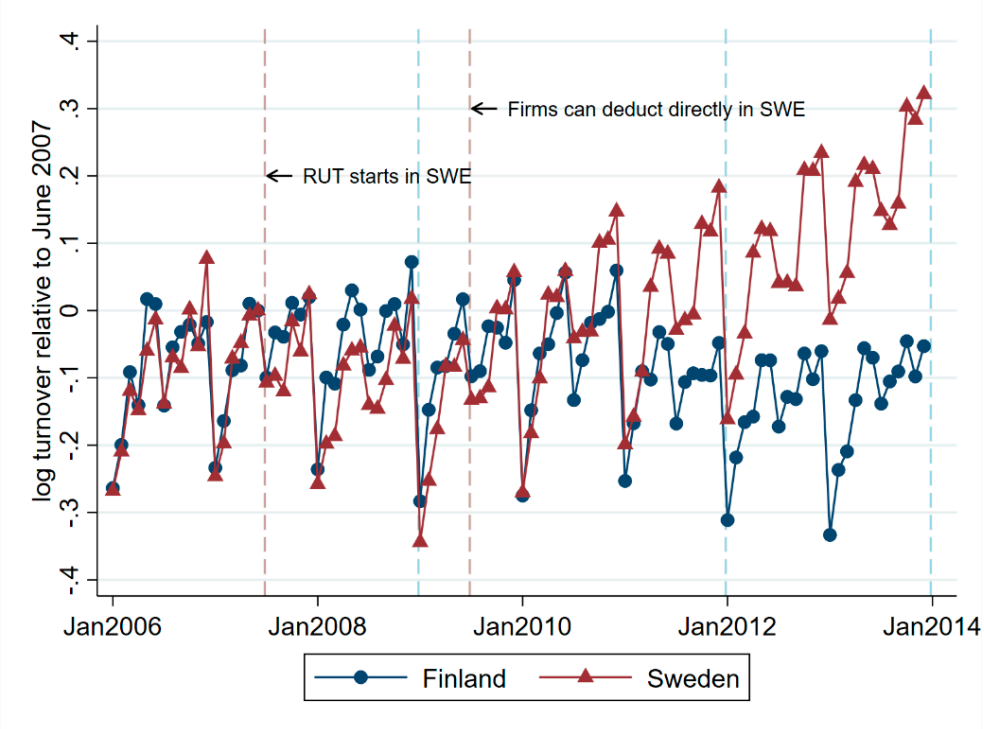
Note: Development of profits of firms with sales under EUR 30,000 in 2008, estimated with firm fixed-effect regressions.

Figure 55. Profits of firms with sales above EUR 30,000 in 2008



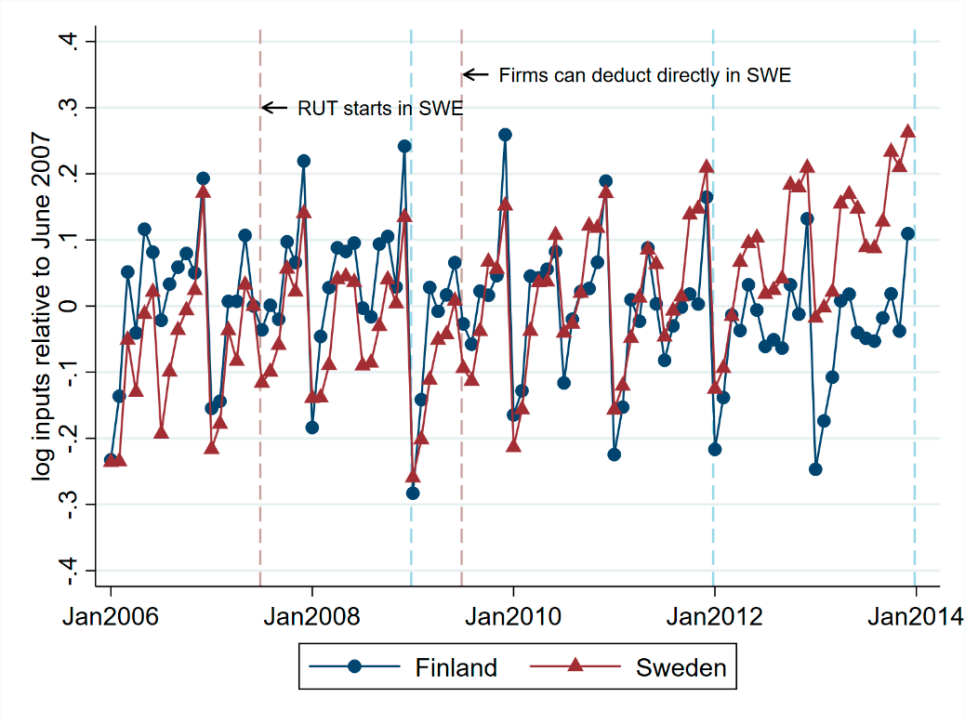
Note: Development of profits of firms with sales above EUR 30,000 in 2008, estimated with firm fixed-effect regressions.

Figure 56. Cleaning – Firm-level trends in sales relative to June 2007



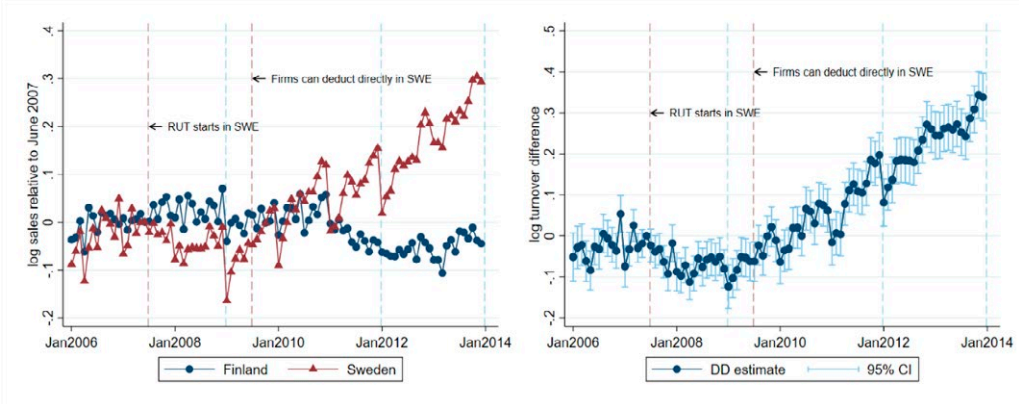
Note: Coefficients from a firm-fixed effect regression of log monthly turnover on month, binary variables relative to June 2007. Sales are adjusted to the price level of January 2006. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden.

Figure 57. Cleaning – Firm-level trends in input spending relative to June 2007



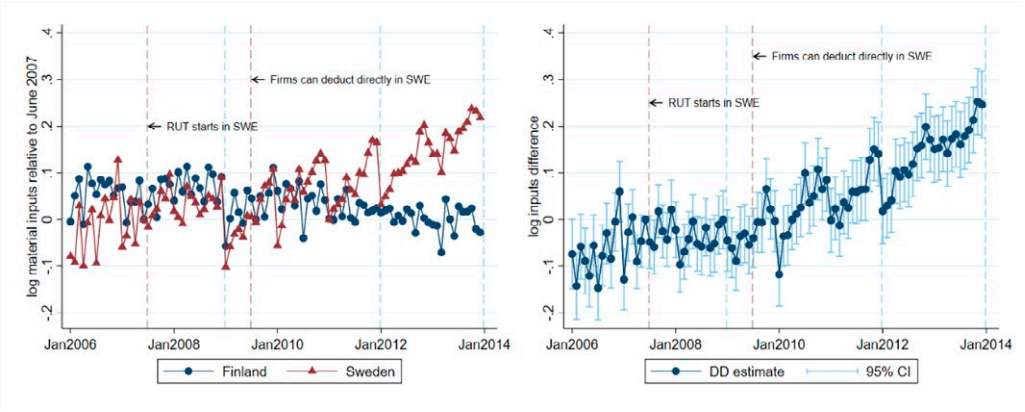
Note: Coefficients from a firm-fixed effect regression of log monthly input spending reported for VAT purposes on month, binary variables relative to June 2007. Material input spending refers to input usage for which firms have claimed VAT deductions. Input spending is adjusted to the price level of January 2006. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden.

Figure 58. Cleaning – Firm-level trends in sales relative to June 2007, seasonality adjusted



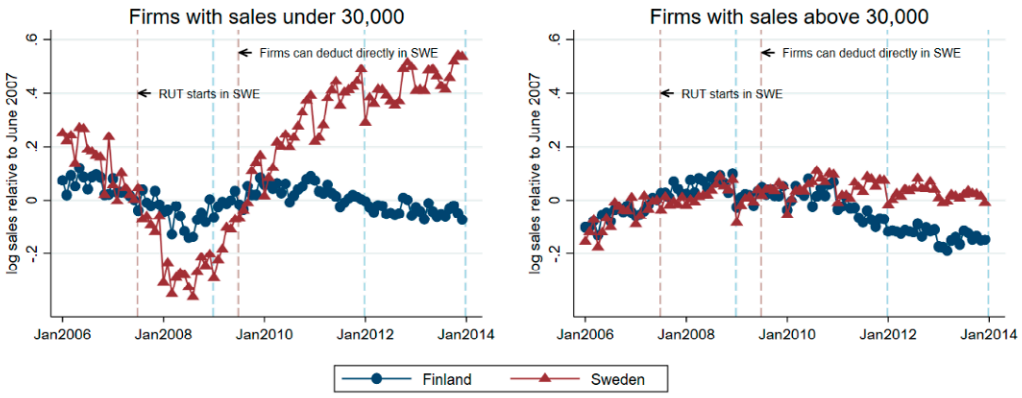
Note: Coefficients from a firm-fixed effect regression of log monthly turnover on month, binary variables relative to June 2007. Sales are adjusted to the price level of January 2006. The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden.

Figure 59. Cleaning – Firm-level trends in input spending relative to June 2007, seasonality adjusted



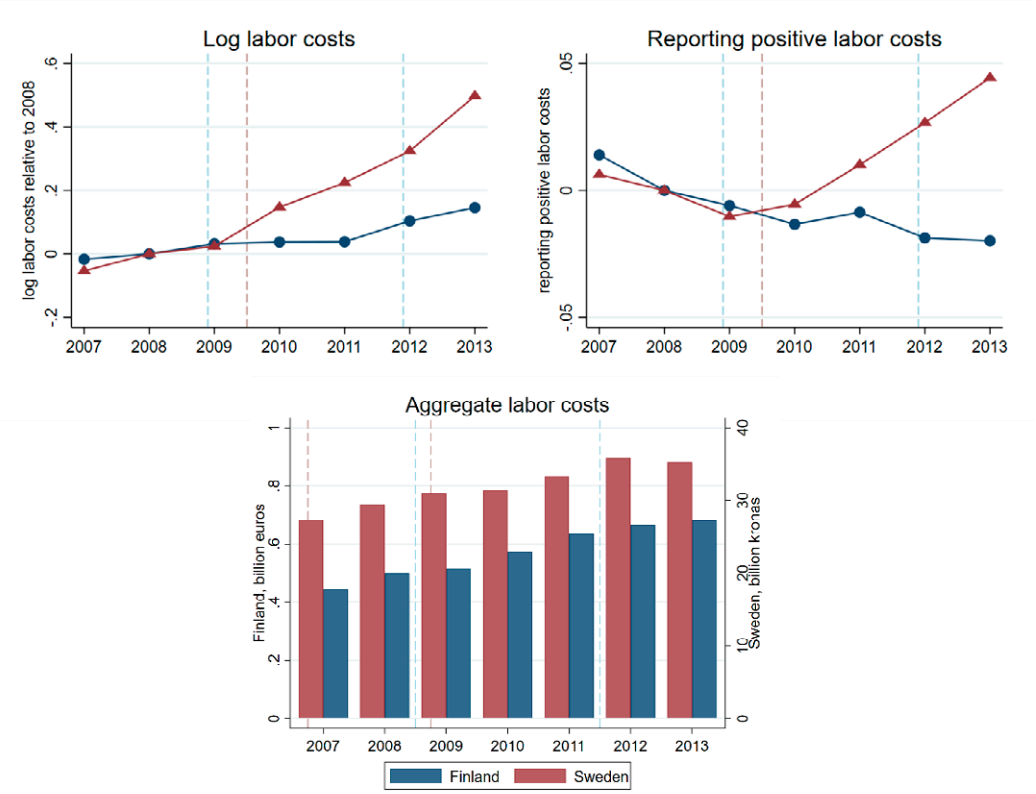
Note: Coefficients from a firm-fixed effect regression of log monthly material input spending on month, binary variables relative to June 2007. Material input spending refers to input usage for which firms have claimed VAT deductions. Input spending is adjusted to the price level of January 2006.The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden.

Figure 60. Cleaning – Firm-level trends in firms with 2008 sales below and above EUR 30,000 relative to June 2007, seasonality adjusted



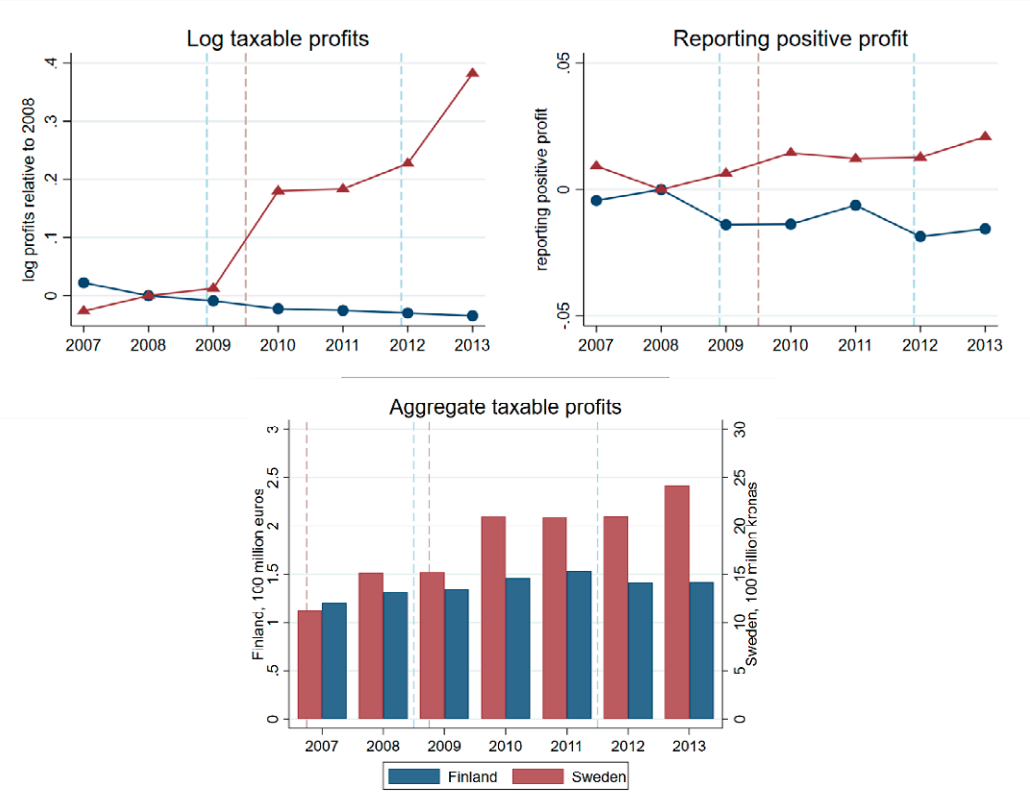
Note: Coefficients from a firm-fixed effect regression of log monthly material input spending on month, binary variables relative to June 2007. Size groups are defined based on 2008 annual sales. Sales are adjusted to the price level of January 2006.The blue dashed vertical lines denote changes in the household tax credit system in Finland and the red dashed vertical lines denote changes in Sweden.

Figure 61. Cleaning – Firm-level trends in annual labor costs



Note: The first graph plots coefficients from a firm-fixed effect regression of log annual labor costs on year. The binary year variables capture annual labor costs relative to 2008. Labor costs are adjusted to the price level of 2006. The blue dashed vertical lines denote changes in the tax credit system in Finland and the red dashed vertical lines denote changes in Sweden. The second figure plots the coefficients from a firm fixed-effect regression of binary variable with zero indicating reporting positive labor costs that year. While not reporting labor costs is common as there are many small sole-proprietor businesses, more firms have started to report labor costs after 2009. The third graph plots aggregate nominal labor costs in the cleaning sectors in Sweden and in Finland. The figure suggests that while at the firm level there are positive effects driven by small firms, on the aggregate level the effect of the reform on labor costs is modest given the preceding positive trend in both countries.

Figure 62. Cleaning – Firm-level trends in annual taxable profits



Note: The upper-left graph plots coefficients from a firm-fixed effect regression of log annual taxable profits on year. The binary year variables capture annual profits relative to 2008. Taxable profit is adjusted to the price level of 2006. The blue dashed vertical lines denote changes in the tax credit in Finland and the red dashed vertical lines denote changes in Sweden. The second figure plots the coefficients from a firm-fixed effect regression of binary variable with zero indicating reporting positive profits that year. The third graph plots aggregate nominal profits in the cleaning sectors in Sweden and Finland. The figure suggests that the firm-level effect also shows on the aggregate level. As a response to the change in the HTC system in Sweden in 2009, firms seem to make significantly more profits.

Table 26. Difference-in-differences results for cleaning industry – reforms in Sweden

	Sales			Inputs		
	(1)	(2)	(3)	(1)	(2)	(3)
1st reform estimate	-0.023	-0.029*	-0.034**	-0.031	-0.032	0.000
	0.013	0.013	0.013	0.017	0.017	0.017
2nd reform estimate	0.119***	0.109***	0.103***	0.075***	0.070***	0.104***
	0.016	0.016	0.015	0.020	0.020	0.019
Firm fixed effects	X	X	X	X	X	X
Time fixed effects	X	X	X	X	X	X
Pre-trend controlled	X	X	X	X	X	X
Winsorized data		X	X		X	X
Seasonality adjusted			X			X
Constant	9.378***	9.357***	0.143	8.376***	8.318***	1.087
	0.153	0.149	0.299	0.224	0.219	0.586
N	535507	535507	522908	526368	526368	514337

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports difference-in-differences estimation results of the 2007 and 2009 reforms in Sweden for the cleaning industry. The 1st reform refers to the introduction of the HTC for cleaning services and the 2nd reform refers to the change to the invoicing system in which firms claim the credit on behalf of customers (no change in parameters). The first three columns report results for sales with different specifications and the second three columns report results for material input usage. The first specification includes firm and year fixed effects, the second specification additionally uses data winsorized at the 1-percentage-point level and the third specification is adjusted for monthly seasonality.

Appendix for the Survey

Questionnaire for the survey (in Finnish)

T22774 Kotitalousvähennys ja harmaa talous 30.3.2020 Pah/Taloustutkimus

Ohjeet ohjelmointia varten punaisella

ALKUSPEAK:

Teemme tutkimusta, jonka aiheena on kotitalousvähennys, sen käyttö ja siihen liittyvien sääntöjen tuntemus. Toivomme, että sinulla olisi hetki aikaa vastata tähän kyselyyn. Vastauksiasi tullaan käyttämään tutkimuskäyttöön, ja vastaukset käsitellään anonyymisti ja luottamuksellisesti. Kyselyn kesto on noin 10 minuuttia.
(alkuun Taloustutkimuksen vakiojutut soittovalikkoon)

Kysymys 1. Kysymme aluksi eri palveluiden käytöstä. Kysymys koskee palveluita, jotka on teetetty omassa- tai puolison, vanhempien- tai isovanhempien asunnossa tai vapaa-ajan asunnossa. Asunto voi olla omistusasunto tai vuokra-asunto. Kysymys ei koske sijoitusasunnon kunnossapito- ja perusparannustöitä, koska tällainen asunto ei ole omassa käytössä.

Millä euromäärällä yhteensä olet hankkinut seuraavia palveluita viimeisen 12 kuukauden aikana?

Remonttityötä? : _____ eurolla
Siivous-/kotitaloustyötä? : _____ eurolla
Hoito-/hoivatyötä? : _____ eurolla

Haastattelijaohje: Jos ei ole hankkinut/teetättänyt kyseistä palvelua, merkitään 0 euroa

Jos vastaaja ei ole teettänyt kyseisiä palveluja (kaikissa on 0 euroa), siirrytään tämän jälkeen kysymykseen 3.

Kysymys 2.

Kysymys 2 kysytään niistä palveluista, joista on ostoja kysymyksessä 1

Millä euromäärällä edellä mainitsemistasi palveluostoista olet pyytänyt tai aiot pyytää kotitalousvähennystä?

Remonttityöstä? _____ eurolla + En osaa sanoa
Siivous-/kotitaloustyöstä? _____ eurolla + En osaa sanoa
Hoito-/hoivatyöstä? _____ eurolla + En osaa sanoa

Haastattelijaohje: Tässä tarkoitetaan palveluostojen kokonaissummaa, jonka vastaaja on ilmoittanut tai aikoo ilmoittaa Verohallinnolle vähennystä hakiessaan.
Ohjelmointiin tarkistus: Euromäärä ei voi olla suurempi kuin mitä kysymyksessä 1 mainittu.

Kysymys 3.

Seuraavaksi kysyn kotitalousvähennyksen sääntöjen tuntemuksesta. Anna paras arvioisi, vaikka et tietäsikään asiasta.

Mikä on kotitalousvähennyksen korvausprosentti, kun maksat yritykselle työstä?

Vastaus: _____% + En osaa sanoa

Mikä on enimmäismäärä euroissa, jonka kotitalousvähennystä voi vuoden aikana vähentää veroista?

Vastaus: _____ euroa + En osaa sanoa

Minkä verran mielestäsi voit saada kotitalousvähennystä, jos teetät asunnossasi 4 000 €:n arvoisen kylpyhuoneremontin, jossa laskutettavan työn osuus on 1 000€ ja käytettyjen materiaalien arvo on 3 000€? Vähennysprosentti on 40 %. Anna paras arvioisi, vaikka et tietäisikään asiasta.

Vastaus: _____ euroa

Haastattelijalle tiedoksi: Selventävä aputieto tarvittaessa: Oletetaan, että yritys on ennakkoperintärekisterissä ja henkilöllä on riittävästi tuloja ja käyttämätöntä vähennystä eli palvelusta voi vähentää kotitalousvähennyksen)
Jos joku kysyy: Oikea vastaus vuonna kysymykseen C 2020 on 1 000 euroa x 40% – omavastuu 100 euroa = 300 euroa.

Kysymys 4 A).

Kuvittele, että olet tilanteessa, jossa harkitset teettäväsi remontti-, kotitalous- tai hoivatyötä vuonna 2020. Vuonna 2019 vähennyksen määrä oli 50 % laskutettavan työn osuudesta ja kuluvana vuonna 2020 vähennyksen määrä on 40 % laskutettavan työn osuudesta. Miten tämä vähennyksen 10 prosenttiyksikön alenema vaikuttaisi ostohalukkuuteesi? SINGLE

Tällä ei olisi vaikutusta ostohalukkuuteeni
Ostaisin todennäköisesti vähemmän
Ostaisin todennäköisesti enemmän

Jos vastasi 4A ostaisi todennäköisesti vähemmän, kysytään 4Aa

kysymys 4Aa) Millä euromäärällä vähentäisit palvelujen ostoasi vuoden aikana? Esimerkki: Vähentäisi siivouspalvelujen ostokertoja eli näiden vähennettyjen palvelujen maksun arvon.

Vastaus: _____ euroa + En osaa sanoa

Kysymys 4 B).

Vuonna 2020 kotitalousvähennyksen enimmäismäärä on 2250 euroa. Jos enimmäismäärä laskisi 1000 euroon, miten tämä muutos remontti-, kotitalous- tai hoivatyöpalveluiden enimmäismäärässä vaikuttaisi ostohalukkuuteesi? SINGLE

Tällä ei olisi vaikutusta ostohalukkuuteeni
Ostaisin todennäköisesti vähemmän
Ostaisin todennäköisesti enemmän

Jos vastasi 4b ostaisi todennäköisesti vähemmän, kysytään 4Ba

kysymys 4Ba) Millä euromäärällä vähentäisit palvelujen ostoasi vuoden aikana?

Vastaus: _____ euroa + En osaa sanoa

Kysymys 5 A).

Oletko teettänyt viimeisen 12 kuukauden aikana remontointi-, kotitalous- tai hoivatyötä tietäen, että palveluntarjoaja ei aio maksaa veroja saamastaan työkorvauksesta? SINGLE

Vastaus: Kyllä / Ei + En osaa sanoa

Jos vastaisi 5A ”Kyllä”, kysytään 5Aa

Kysymys 5Aa) Millä euromäärällä ostit palvelua?

Vastaus: _____ euroa+ En osaa/halua sanoa

Kysymys 5 B).

Tiedätkö, onko joku lähipiirissäsi, kuten naapurustossasi teettänyt viimeisen 12 kuukauden aikana remontointi-, kotitalous- tai hoivatyötä tietäen, että palveluntarjoaja ei aio maksaa veroja saamastaan työkorvauksesta? SINGLE

Vastaus: Kyllä / Ei + En osaa sanoa

Jos vastaisi 5B ”Kyllä”, kysytään 5Ba

Kysymys 5Ba) Mikä oli palvelun rahallinen arvo? Anna paras arviosi euromäärästä.

Vastaus: _____ euroa + En osaa sanoa

Kysymys 6. Seuraavaksi kysymyksiä liittyen koronaviruksen aiheuttamiin poikkeusoloihin ja palveluiden käyttöön. Oletko jättänyt teettämättä tai siirtänyt myöhemmäksi seuraavia palveluita koronaviruksen aiheuttaman poikkeusolon takia?
Vastausasteikko: Kyllä, Ei, SINGLE

1. Remonttityötä?
2. Siivous-/kotitaloustyötä?
3. Hoito-/hoivatyötä?

K6B kysytään niistä palveluista, joista on ostoja eli kysymyksessä 6=Kyllä

Kysymys 6B. Millä euromäärällä olet jättänyt teettämättä tai siirtänyt myöhemmäksi?

Remonttityötä? summa_____ eurolla + En osaa sanoa
Siivous-/kotitaloustyötä? summa_____ eurolla + En osaa sanoa
Hoito-/hoivatyötä? summa_____ eurolla + En osaa sanoa

Kysymys 7.

Kysymme vielä lopuksi aineiston analysoinnin taustatiedoksi, mikä on kotiosoitteesi postinumero?

Vastaus: _____ + En halua sanoa

Kiitoksia vastauksistasi. Sinua haastatteli xxx Taloustutkimuksesta. (Taloustutkimuksessa yleensä puhelinhaastatteluissa käytetty lopputeksti.)

Additional analyses of age group differences in service and HTC usage

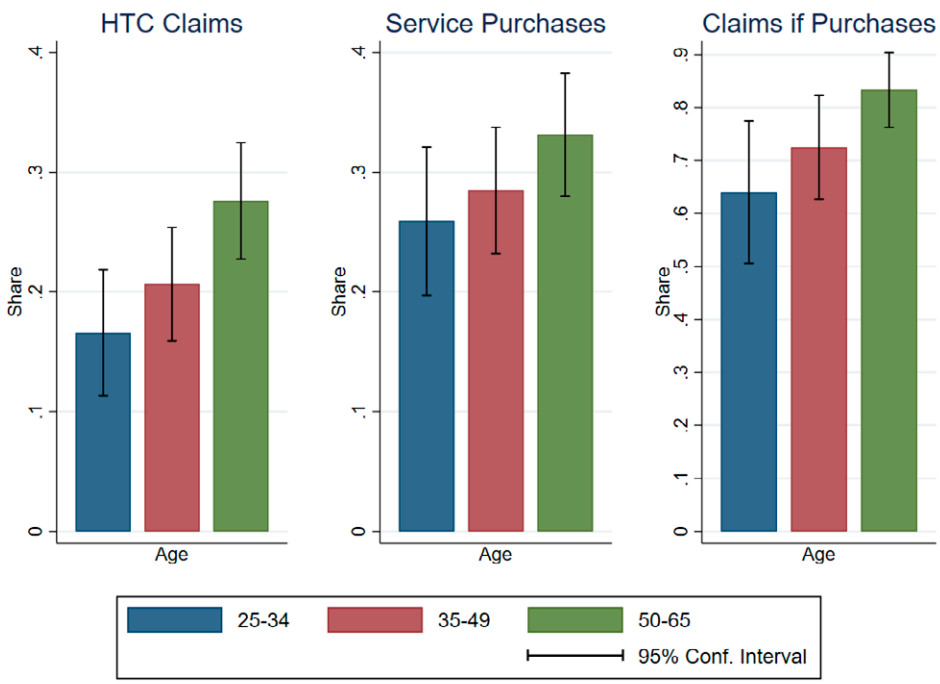
Administrative data shows that on average HTC recipients have been notably older than the average taxpayer. In principle, there are two ways in which this pattern could take place: it may be that older people tend to purchase more services, but it may also be that older people are more likely to apply for HTC for purchases they have made. We cannot make a distinction between these two channels using administrative data, so it is worthwhile looking at differences between age groups in the context of the survey. To do this, we simply regress some HTC and service usage dummies on age groups. The dummies indicate whether or not the respondent 1) has applied or will apply for HTC for purchases made in the past 12 months (claims), 2) has purchased services in the past 12 months (purchases), and 3) has applied or will apply for HTC if the respondent has made service purchases (claims if purchases). The regression results are reported in Table 27 below. Figure 63 provides a graphical version of the main regression results. These results suggest that both channels may be important. Moreover, controlling for the log of the total amount of service purchases reported reduces both the coefficient and the significance of the age dummies in the regression of claims if purchases on covariates. This would suggest that older age groups spending more money on services can be a major driver of the age group differences in the likelihood of applying for HTC on service purchases. This is natural as the incentives to apply for HTC are likely to increase with purchase amounts. However, when we use the log of the recipients age instead of age group dummies, the coefficient for log(age) is still significant at the 95% confidence level.

Table 27. HTC claims and service purchases by age group

	HTC Claims	Service Purchases	Claims if Purchases		
	(1)	(1)	(1)	(2)	(3)
35-49 old	0.041 (0.036)	0.026 (0.042)	0.085 (0.085)	0.051 (0.531)	-
50-65 old	0.110*** (0.037)	0.072* (0.041)	0.194*** (0.077)	0.130* (0.077)	-
Log(Total amount services purchased)				0.095*** (0.018)	0.094*** (0.018)
Log(Age)					0.240** (0.106)
Constant	0.166*** (0.027)	0.259*** (0.032)	0.640*** (0.068)	-0.043 (0.146)	-0.204 (0.164)
Observations	800	800	238	238	238
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$					

Note: All dependent variables are dummies. Claims if purchases indicates whether the respondent has applied for HTC if the respondent has purchased services.

Figure 63. HTC claims and service purchases by age group



Note: Claims if purchases indicates the share of those with service purchases having applied for HTC.

An additional question is the relative importance of the prevalence of service usage and HTC application rates as explanations of the age differences in HTC usage. As only persons who made service purchases reported having applied for HTC, we can decompose the share of HTC claimants in each age group as

$$\begin{aligned} &Share\ of\ HTC\ claimants \\ &\quad = Share\ with\ service\ purchases \\ &\quad \times Share\ of\ claimants\ of\ those\ with\ service\ purchases. \end{aligned}$$

This allows us to look at how the two channels contribute to the relative differences between age groups by

$$\begin{aligned} &\Delta \log(Share\ of\ HTC\ claimants) \\ &\quad = \Delta \log(Share\ with\ service\ purchases) \\ &\quad + \Delta \log(Share\ of\ claimants\ of\ those\ with\ service\ purchases), \end{aligned}$$

where $\Delta\log$ refers to the approximate relative difference between two age groups. Table 6 below reports these relative differences compared to the oldest age group in the sample (50-65-year olds). What is interesting is that, at least in our sample, both the prevalence of service consumption and the group-level tendency to apply for HTC for those purchases

each contribute roughly half of the age group differences in HTC usage. One should, however, note that as the group differences are large, the differences in log shares are very rough estimates of the relative differences. Nevertheless, the relative importance of the two determinants of age group differences in HTC usage should not be very sensitive to this.

Table 28. Decomposing relative differences in HTC usage by age group

Age group	HTC Claims	Service Purchases	Claims if Purchases
Aged 25-34 relative to 50-65	- 50.0 %	- 24.6 %	- 26.4 %
Aged 35-49 relative to 50-65	- 29.1 %	- 15.2 %	- 13.9 %

Note: Claims if purchases indicates the share of those with service purchases having applied for HTC.

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