The inefficiency of reduced VAT rates: Evidence from restaurant industry*

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Abstract

This paper provides estimates of the effects of consumption taxes on prices, demand and employment for restaurant services. We utilize a large VAT reforms affecting restaurant meals, where the VAT rate was cut in July 2010 in Finland and in January 2012 in Sweden. By comparing with restaurants in neighboring countries, these reforms offer a natural experimental approach. The results indicate that restaurants reduced their prices by only little. On average, the price reductions are approximately a quarter of the full pass-through. Remarkably, at the same time a majority of restaurants did not reduce their prices at all. We do not observe any increases in the quantity of meals sold or in wage sums paid to employees. These results imply that the demand for restaurant meals is rather inelastic and the main objective of the reforms of increasing employment in the industry was not fulfilled.

Keywords: VAT reform, restaurants, tax incidence
JEL codes: H21, H22, H32

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1 Introduction

Internationally, the share of consumption taxes of total tax revenue seems to be increasing all the time. Governments have also tried to support specific industries through reduced consumption tax rates aiming to create jobs in these sectors. This has also been the main motivation behind EU's policy to allow certain industries to apply lowered VAT rates. Despite the vast theory literature[1], there is only a narrow empirical literature estimating the effects of consumption taxes on prices,a and especially on quantities (Carbonnier (2007), Doyle and Samphantharak (2008), Kosonen (2010), Marion and Muehlegger (2011)). Many studies focus solely on price incidence. However, price responses are not sufficient statistics for more thorough efficiency analysis. From the point of view of policymaker, it is even more important to know the demand elasticity of a good or a service.

This study aims to produce policy-relevant statistics on the efficiency of consumption taxation by analyzing value added tax (VAT) reforms affecting restaurants in Finland and in Sweden. The VAT for restaurant meals was cut from the standard rate of 22% to the reduced rate of 13% in July 2010 in Finland. Similar VAT rate reduction happened in Sweden from the beginning of 2012 when the VAT rate for restaurant meals was cut from 25% to 12%. We utilize these policy changes to investigate the effects of consumption taxes on prices, demand for restaurant services and wage sums paid to employees. The results offer insights into the effectiveness of consumption taxes in restaurant industry and in labor-intensive sectors more generally.

We apply a difference-in-differences (DD) approach. In price estimations restaurant meals in the treatment group are compared against multiple control groups. In demand and empoloyment estimations we use restaurants in Sweden as a comparison group when we examine the VAT cut for Finnish restaurants, while studying the Swedish reform we apply Finnish restaurants as a control group. The identifying assumption in the DD approach is that a control group should behave similarly to a treatment group without facing a treatment. In the current setting this assumption is likely to be fulfilled, since we compare the same sectors in neighboring countries with a similar climate and culture. We also provide empirical support that shows similar pre-reform development of restaurant meal prices and turnover over time across countries. Importantly, the reforms are exogenous to the behavior of

[1]E.g. Ramsey (1927), Atkinson and Stiglitz (1976), Myles (1989).

firms, since it was made possible by European Union-level rules. It also seems that restaurants did not anticipate the VAT cut by altering their prices prior to the reforms.

Our price data come from a self-designed price collection method. The collection is for a random sample of restaurants in Finland, Sweden and Estonia, and hotels that are also used as a control group. Prices were collected from the websites of the firms in the sample, or if this was not possible, by phone. The data includes the price of the same meal in the same restaurant, and the price of the same room in the same hotel before and after the reform. Thus the price information allows us to follow the development of prices of individual services. By looking at the relative change of all services, we are able to describe the whole distribution of price changes, rarely possible in the previous literature. In addition, we estimate the average price response with meal-level fixed-effects, which gives us high precision. The collection contains also information about interesting predetermined characteristics of firms, allowing us to divide the results by them. For robustness we also use restaurant meal price data from Norway, Sweden and Finland originating from data collected for the construction of consumer price indices.

Additional and even greater interest in this paper lies in the impact of the reform on the demand for restaurant services and wage sums. For this we have a monthly and annual level tax register data from Finnish and Swedish Tax Administrations. On monthly level we have information about turnover, which is the consumer price value of services sold, and the wage sums of each firm per month. Comparing the development of prices and turnover of the same firms in the treatment and control groups over the reform period allows to estimate the impact of the reform on the quantities of services sold. The development of wage bills in the two groups over the reform period gives an indication of whether there are any changes in employment due to the reform. In addition, we examine entry into and exit out of the restaurant industry.

Our unweighted average consumer price result shows that the VAT cuts reduced restaurant prices by only little, approximately 2% in both reforms. Full pass-through to consumer prices would have implied much higher responses. The result implies that the actual price reduction was at most a fourth of the full pass-through. The consumer-weighted price response was somewhat larger in Finnish reform but not in Swedish reform. However, even in the Finnish reform our baseline weighted pass-through result to prices is approximately half of the full pass-through. As the weighted price responses

are larger than unweighted in Finland, it implies that larger restaurants reduced their prices more than small restaurants.

The estimation results suggest no increase in demand for restaurant services or employment due to the reforms. The analysis shows that the quantity of restaurant meals did not change after the reforms. Also, the level of wage sums did not change. This result suggests that there is no changes in the level of wages paid to the employees in the restaurant industry nor the amount of employees. Furthermore, we do not find any effects on entry into or exit out of the industry due to the reform. The conclusion from this analysis is that the demand for restaurant meals is rather inelastic, and the main aim of the policy allowing lower VAT rates to increase employment are not fulfilled.

Our results contribute to a narrow empirical literature estimating the effects of consumption taxes. Many studies in the previous literature concentrate on industries with only few producers and industries where large companies dominate the market. We concentrate instead on the restaurant industry, which contains very heterogeneous firms and is a labor-intensive industry. Also, generally, the number of studies that have produced results on the quantity of services sold or wage sums is fairly limited.

Doyle and Samphantharak (2008) estimated the tax incidence on gasoline prices in certain states in the USA from a temporary repeal and reinstatement of a gasoline consumption tax. They found almost 100% pass-through on prices. Marion and Muehlegger (2011) found similar estimates for fuel prices. Carbonnier (2007) found lower pass-through for a car retailer industry than for a repair service industry when he analyzed two separate VAT rate reductions in France. He interpreted this to be a result of differences in the degree of competition in these industries. Kosonen (2010) found that the pass-through on prices was half of the full pass-through for the hairdressing service industry, after a VAT reduction in Finland. Kosonen also studied the demand for hairdressing services and employment. He concluded that the demand for these services seems to be rather inelastic. Hairdressers and restaurants resemble each other since both are labor-intensive service sectors. Therefore it is not surprising that our results are very much in line with that study.

The paper proceeds as follows. Section 2 presents the institutional background and economic theory predictions as a result of the VAT reduction. Section 3 presents the methods used in the study, section 4 describes the data and section 5 presents the results for different outcomes. Finally, section 6 concludes the study.

2 Institutions and predictions

2.1 Value-added taxation in the EU

The European Union obligates all Member States to apply value-added taxation as a consumption tax system. Since 1977 the EU has applied uniform VAT coverage under the Sixth VAT Directive. The new VAT Directive replaced it in 2007 (CD 2006/112/EC). The Directive states that Member States can have one standard VAT rate between 15% and 25% and at most two reduced rates of at least 5%[2].

The Council of the EU introduced the possibility of applying a reduced VAT rate on labor-intensive services already in 1999 (CD 1999/85/EC). Although reduced VAT rates for certain labor-intensive industries were possible from 1999 onwards, such rates were not available for restaurants until May 2009 (CD 2009/47/EC). Thus, prior to 2009, restaurant services were subject to the standard VAT rate in all EU Member States. France was the first to apply a reduced rate for restaurant services. In July 2009, the VAT rate was cut from 19.6% to 5.5% (OECD (2010)). Despite the substantial reduction in the VAT rate, prices only fell by 1.4% after the reform (MEIE (2010)).

This paper examines the effects of the two separate reforms for restaurant sector. The first took place in Finland at the beginning of July 2010 (HE 137/2009) and the second was in Sweden at the beginning of 2012. Finnish VAT cut was from 22% to 13% and the VAT reduction in Sweden was larger, from 25% to 12%.

2.2 Tax shifting and optimal consumption tax

Let us first consider the tax incidence of the VAT rate on consumer prices. A change in the VAT rate can shift to consumer prices by varying degrees. Under perfect competition, the price incidence depends on the elasticities of demand and supply. For instance, if demand is fairly inelastic and supply very elastic, there would be close to full pass-through to consumer prices. In general, the pass-through to prices increases with supply elasticity and decreases with the demand elasticity.

When the number of firms is limited and/or there is strategic interaction between the firms (imperfect competition), consumption taxes could under-

[2]There are some exceptions from the lowest tax rates, e.g. zero rates on books in the United Kingdom. Some sectors are also exempted from VAT, e.g. postal services.

or over-shift to consumer prices. The elasticities of demand and supply also affect the pass-through in an imperfect competition model. Additionally, in an imperfect competition model, the shape of the demand curve relative to the perfect competition prediction affects the pass-through. With a concave demand curve, the tax under-shifts to prices but with a convex demand curve over- shifts to prices (Myles (1989), Weyl and Fabinger (2013)).

We study the price incidence with a reduction in the VAT rate for restaurant services. The data include prices for the same meal offered in the same restaurants before and after the reform. Thus, as we analyze the price effects, we can identify the proportional change in consumer prices for each meal in the following way:

$$\Delta = \frac{p^a - p^b}{p^b} * 100 = x\% \tag{2.1}$$

$$\phi * (1 + \tau^b) = p^b \blacktriangleright \phi * (1 + \tau^a) = p^a$$

where p^a is the consumer price after the reform and p^b is the consumer price before the reform. The consumer price is the producer price ϕ plus the VAT. If we assume that ϕ does not change, the full pass-through in the case of Finnish VAT cut is:

$$\frac{\phi(1.13 - 1.22)}{\phi 1.22} * 100 = -7.38\%$$

and in the case of Swedish VAT cut:

$$\frac{\phi(1.12 - 1.25)}{\phi 1.25} * 100 = -10.40\%$$

A couple of remarks should be made. First, the quality of the meals could change due to the reform. The quality of meals could perhaps increase as the costs of producing them decrease, if there are no changes in prices. But if the quality of meals increases due to the reform, the restaurants are likely also rename the meals as well. On the other hand, the quality of meals could decrease in those restaurants that lower their prices. Even where the price decreases and the quality of the product decreases, price changes when applying the above equation would give us an upper bound for the pass-through. However, it is important to note that the price data we have, concerns meals offered by restaurants exactly with the same name before and after the reform. Thus, we assume that the quality does not change if the name of the meal does not change.

Second, there might be cross-price effects on other goods or services. A restaurant meal can be a substitute or a complement for other goods or services affecting the amount of consumption or prices of these other goods due to the reform for meals. For example, lunch meals during the working day can be a substitute for lunch boxes or take-away meals from a restaurant. On the other hand, a restaurant meal can be complementary to hotel services, especially during holiday seasons. Despite these problems, restaurant meals represent only a small proportion of the whole consumption budget (3.6% in 2006) and thus the effects due to substitutability or complementarity should be small.

In order to design an optimal consumption tax system, a perfectly competitive model result implies that the consumption tax rates of a good or a service should vary according to the elasticity of its own demand, the elasticity of supply and the cross-price effects on other goods. In the case of fairly inelastic demand, a good should face a higher tax rate than a good with elastic demand, if cross-price effects between taxed goods are zero. The reason is that an increase in the tax rate of an inelastic good would have only little effect on demand for the good and thus lead to only small distortions in the demand for that good (Ramsey (1927), Diamond and Mirrlees (1971)). However, cross-price effects could be high if there are close complements or substitutes for a taxed good.

The literature presents another argument for efficient consumption taxation. This concerns the distortions created by labor taxation on labor supply (Atkinson and Stiglitz (1976)). These distortions could be diminished by using consumption taxation. The result is that these distortions diminish if the consumption of goods or services highly complementary with work are taxed less, and vice versa. Clearly this suggests setting lower tax rates for goods and services that are closely related to work and labor, and tax more the consumption of goods that are related to leisure. We do not analyse this argument in this paper. This is because the complementarity of a restaurant meal with labor supply is not clear. It is complementary with work if we consider lunches during the working day. On the other hand, a restaurant meal is complementary with leisure in terms of enjoying meals one's spare time, e.g. fine dining. Moreover, restaurant services represent only a small fraction of the total consumption basket of an average individual (3.6% in 2006 in Finland[3]). Thus changes in taxation for this small share of one's

[3]Statistics Finland: Household Budget Survey (2009).

consumption are not likely to greatly affect the substitutability of labor.

We assess the efficiency of the consumption tax system for restaurant services by examining the effect of the VAT cut on the quantity of restaurant meals sold and wage sums paid to employees. The best case scenario to evaluate the demand for a good would be to be able to observe the price of a good and the amount of the good sold by the firm. The second best case is to observe prices and the total sales of the firm. This is what we have in our data set, including prices and the reported value of turnover in consumer prices.

Assume for now that the whole turnover consists of sold restaurant meals. Then turnover is simply the quantity of restaurant meals sold times the consumer price. With this variable we estimate the changes in demand (quantity) due to the VAT reform. If there are no changes in consumer price and quantity, turnover would remain the same over time, before and after the reform. However, if the consumer price decreases due to the VAT rate reduction and quantity remains the same, turnover decreases by the amount of the price decrease. If the consumer price decreases and the quantity sold increases relatively more than the price decreases, turnover would increase. We observe the consumer prices for restaurant meals and the monthly level consumer price value of total sales in the data before and after the VAT reduction. Thus we have an opportunity to investigate the changes in the quantity of meals sold for each restaurant and interpret how demand changed due to the reform.

We also estimate the effects of the VAT reduction on wage sums. The costs of producing restaurant meals decreased due to the VAT reduction. This could increase the wage payments of a restaurant to its employees and/or increase the number of employees working in a restaurant. The wage sums of restaurants would then increase due to the reform if restaurants hire more workforce and/or pay more wages to their current workers after the reform.

3 Methods

This section describes the methods. Because of the exceptional data sets, we make extensive use of graphical analysis to examine the effects of the reform. We show the whole distribution of relative price changes, applying the equation (2.1), as we follow the prices of the same product or service before and after the reform. Graphical evidence shows explicitly the whole range

of price changes and thus is more informative than, for example, a standard mean regression of the change in prices. When examine the responses on turnover and wage sums, we can compare the growth rates of these variables between restaurants in neighboring coutries.

We also use a natural experimental method to investigate the average effect of the reforms on prices, turnover and wage sums. We apply a standard Difference-in-Differences (DD) method with meal fixed-effects to estimate the average effect of the reform on meal prices. The simplest set-up of the DD method is when outcomes are observed for two separate groups for two different time periods. The standard way to describe the method is to present the following equation:

$$P_{it} = \eta_i + \beta_1 1(Treat)_i + \beta_2 1(After)_t + \beta_3 1(Treat_i * After_t) + \beta_4(X_{it}) + \varepsilon_{it} \tag{3.1}$$

where the dependent variable P represents the logarithmic meal price of firm i at time t, the constant η_i is the estimated fixed effect for every meal, *1(Treat)* is an indicator variable with the value one for treated and zero otherwise, *1(After)* is also an indicator variable with the value one after the reform and zero otherwise, and *1(Treatment*After)* represents the interaction variable of these two variables. The coefficient of this interaction term identifies the effect of the reform on outcome P. X contains a vector of firm-level control variables and ε is the i.i.d. error term.

As a result of the fixed-effects estimation, β_3 represents the average proportional change in meal prices as a result of the reform. We are able to perform a meal-level fixed-effects estimate because we followed the prices of the same meals in the same restaurants over time, before and after the reform. This gives us a very precise price estimate.

The treatment group consists of Finnish restaurants which experienced the VAT reduction at the beginning of July 2010. In addition, the treatment group consists Swedish restaurants at the time of the Swedish VAT cut, 2012 onwards. We use many separate control groups to show the robustness of the results. When we analyze the effects of the Finnish VAT reform on prices we use mainly restaurant meal prices in Estonia to formulate the control group. While studying the price effects of Swedish VAT cut, we apply Finnish restaurant meal prices as a comparison group. We also use Finnish, Swedish and Norwegian Consumer Price Index (CPI) data for restaurant meals to represent control groups. To further show the robustness of our results we also

make use of hotel industry as a comparison group in the price estimations.

We apply the same DD method, described in equation 3.1, when we examine the demand and employment effects of the reforms. The measure applied for demand is the monthly turnover of the firms valued at consumer prices and for employment the measure is the monthly wage sums paid to employees. In these estimations we use Finnish restaurants in the treatment group and Swedish restaurants in the control group when we study the effects of Finnish reform. In the case of Swedish reform we apply Finnish restaurants as a comparison group for Swedish restaurants.

The main identifying assumption in the DD approach is the parallel time trends. Thus the time effects should behave similarly in both groups before the reform. The difference between the groups is that one of the groups is exposed to a treatment and the other is not. A concern in our chosen strategy, from the point of view of identification, might be that restaurants in neighboring countries are not suitable comparison groups. However, comparing neighboring countries in the North Europe is not that much different from comparing neighboring states in the USA as Card and Krueger (1994) did when studying the effects of minimum wage changes. For example, Finland and Sweden resemble each other in institutions, geographic location (both share similar climate), share a border, have similar culture and vacation periods. The EU constraints the VAT legislation in the both countries in the same way. Also both are small open economies that are affected by the world food prices in a similar way. Moreover the two countries have similar seasonality of national food production. In both countries (as in Estonia) Christmas and New Year are celebrated in similar manner and bank holidays are of similar length and on the same dates in the two countries. Therefore, there are a number of reasons to believe that the DD assumption holds in this case.

In addition, the countries face similar weather conditions, global food prices, business cycles etc. We have no reason to believe that e.g. Finnish and Estonian restaurants or Finnish and Swedish restaurants would behave differently from each other during our short examination period without an exogenous shocks. For example, restaurants in Estonia could experience different conditions in the long run, e.g. in the competitive environment, but we do not consider this to be a problem over our relatively short examination period (3 months). Also, for example, when we analyze the Finnish reform we can test the robustness of the results by comparing the prices of Finnish restaurants to restaurant meal prices from the statistics offices in Norway

and Sweden, which are collected for CPI purposes. We believe that all these control groups constitute good counterfactuals for the treatment group.

To give empirical evidence for the main assumption behind DD strategy, we show in figure 1 that the development of consumer price indexes collected by the statistical offices for restaurant meals are very similar in both countries, Finland and Sweden, before the reforms. Similarly the development of CPI for Norwegian restaurants seem to be a good control group for both countries as well. Also, the figure do not suggest any empirical evidence to support anticipation behavior among restaurants before reforms which is also very important for our analysis. In figure 2 we also show that the mean development in turnover and wage sums of restaurants in Finland and Sweden are similar over time. These two figures give us further evidence that we can compare restaurants across countries.

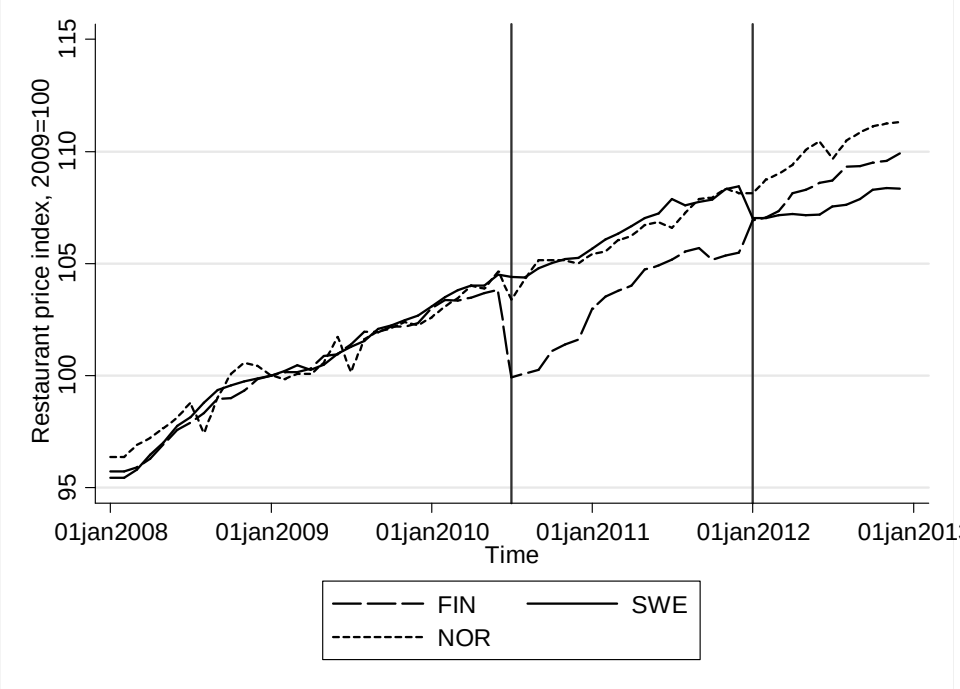

Figure 1: Longer-term development of restaurant prices in Finland, Sweden and Norway

Based on these arguments and graphical evidence, we believe that it is possible to use the standard DD method to examine the causal effects of the

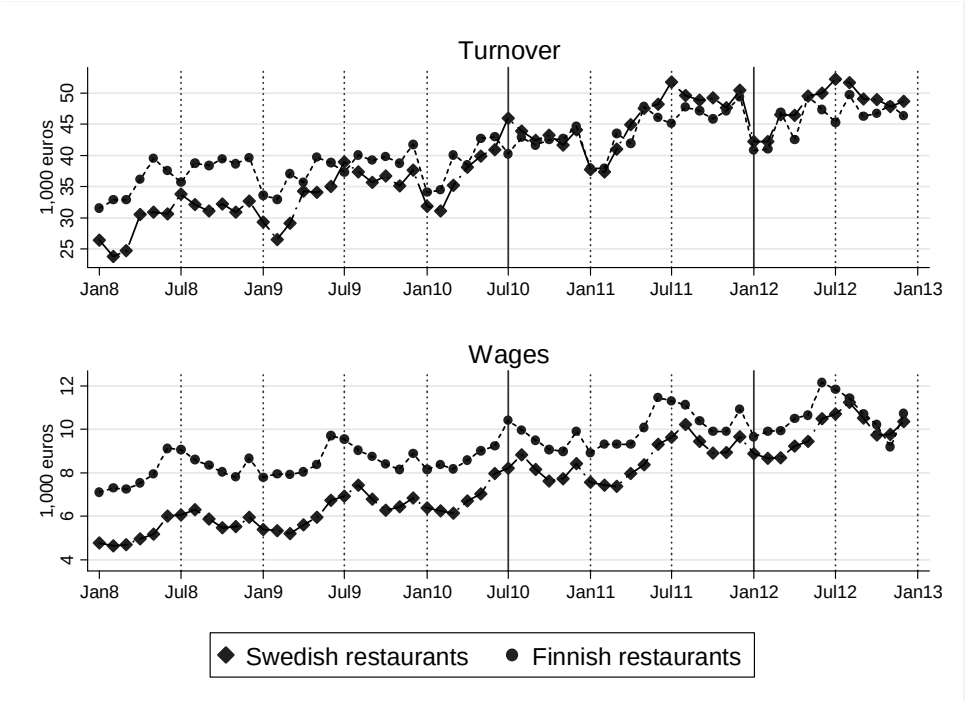

Figure 2: Longer-term development of restaurant prices in Finland, Sweden and Norway

reform on restaurant meal prices, demand for restaurant services and wage sums paid to employees. However, because of the short examination period available we concentrate only on the short-run changes.

One problem in using DD method could be that the policy change is not exogenous. However, the governments in Finland and Sweden allowed the restaurant industry, and not other industries, to apply a reduced VAT rate since the EU Directive permitted them to do so. Thus, the reform was not solely dependent on the economic conditions in the restaurant industry, rather it was an attempt to revive the economy overall.

A further challenge in our empirical set-up is to present appropriate standard errors for the estimates. Two previous papers by Bertrand *et al.* (2004) and Cameron *et al.* (2008) emphasise this problem. The problem arises when the number of groups used in the estimations is small. It could be, for example, that there is an unobserved shock affecting the groups' behavior differently and thus biasing the standard errors. Fortunately, the two pa-

pers mentioned above offer us tools to overcome this problem. Following the guidelines of these papers, we apply a block bootstrap strategy to calculate the standard errors. We use two sets of clusters. First, we apply country-level clusters in the price estimations. Second, when we compare Finnish restaurants to Finnish hotels we use industry-level clusters in the price, quantity and employment estimations. The strategy of calculating standard errors does not affect the significance of results too much as, at most, it doubles the standard errors of the main price estimates with no clustering. However, for the weighted price results block bootstrapping is not possible. Then we only apply heteroscedasticity-consistent standard errors and the significance of these results should be interpreted with caution.

4 Data

We have price data from a price collection method which was conducted on the basis of a random sample of restaurants from the Tax Administration data including all firms liable for VAT in Finland, Sweden and Estonia. We designed our own method to collect prices. We were able to collect prices from approximately 750 restaurants in Finland and 400 restaurants in Estonia before and after the Finnish VAT reform. The price data was collected similarly before and after the Swedish VAT cut. In that data set we have prices from 600-700 restaurants from both Sweden and Finland.[4]

We took a random sample just before the reforms, in March 2010 in the case of Finnish reform and in October 2011 in the case of Swedish reform, from the restaurant industry. The samples are representative of all restaurants in every country. The price collection was made before and after the reform. The data include many important self-collected categorical variables which we can make use of to divide responses, e.g. belonging to a chain, restaurant type, etc.

In the collection method, we mainly collected prices from the internet. If this was not possible via the internet we collected the prices by phone. The collection followed a questionnaire where the restaurants were divided into four categories by restaurant type.[5] Each category had its own questionnaire with a minimum of 7 prices and a maximum of 11 prices. In each round

[4]We also use CPI data sets for restaurant meal prices in Finland, Sweden and Norway as comparison groups in our price-response analysis.

[5]The restaurant types are a la carte, fast food, cafeteria and lunch restaurants.

of collections (before and after) we recorded the price of the same product from each firm. Also, the price collectors used exactly the same collection questionnaires and methods in every country, which is very important for our analysis.

In the upper panel of table 1 we present the descriptive statistics of the price data in euros for the sample around Finnish reform. On average, meal prices seem to be lower in Estonia than in Finland but this is not a substantial problem as we are interested in the price changes over a short period of time. In the lower panel of table 1 we show the descriptive statistics of the price data around Swedish reform. The level of average meal prices seem to be very similar in Finland and Sweden.[6]

We also collected various firm-level categorical variables. The method of collection (phone/internet), belonging to a chain and belonging to a lobbying union representing restaurants and hotels in Finland (MaRa) and in Sweden (Visita) are the most important categorical variables in the analysis. In our study, a firm is considered to being a chain if there is more than one restaurant with same name or firm identifier. We also categorize franchising firms as chains. Union status, instead, represents the leading national trade and labor market association in the hospitality industry in Finland and Sweden, including e.g. both restaurants and hotels. Table 2 describes the statistics of these variables by reforms. In general, most of the price data is from the internet. It seems that Finnish restaurants are a bit more 'organized' than restaurants in Sweden and Estonia as there are more restaurants belonging to a chain and union in Finland than other countries.

The histogram in figure 3 compares the mean of composite of three main meal prices between treatment and control groups in euros. As said previously, the control group consists Estonian restaurants in the case of Finnish reform and Finnish restaurants when we examine the Swedish reform. It seems that the distribution of restaurant meal prices is relatively similar between countries and across reforms. However, the variation in prices seems to be larger in Finland and there is more weight on the right-hand side of the distribution in Finland than in Estonia, in the upper panel. Nevertheless, the shapes of the distributions are similar, and thus we are able to compare Finnish prices with Estonian prices. In the lower panel, we can see that the distributions of meal prices are very similar in Finland and Sweden.

[6]Table A1 in the Appendix shows the descriptive statistics for CPI data from the statistics offices in Sweden and Norway.

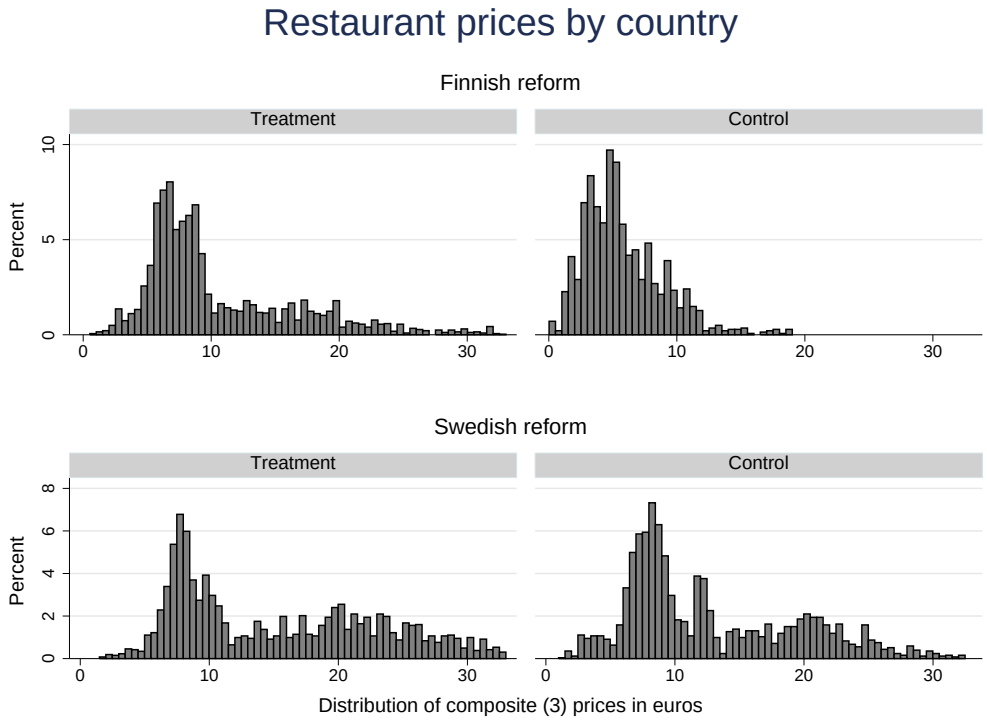

Figure 3: Histogram of the mean of three meal prices in Estonia and Finland

The second data set is from the Finnish and Swedish Tax Administration and include all firms liable for VAT in Finland and Sweden. The data contain important monthly-level information about the firms' activities including turnover and the wage sums paid by the firms. Table 3 shows the pre-reform descriptive statistics of turnover and wage sums per month for Finnish and Swedish restaurants. It seems obvious that restaurants in both countires are very similar in size, on average. We also have an extensive set of yearly-level tax record data which we can employ as controls in our estimations, including information for example about the costs of purchased goods and assets of firms.

Figure 4 shows the average monthly remitted VAT of restaurants taxed at two main VAT rates over time from the beginning of 2008 to the end of 2012. We exclude the VAT remitted at the lowest VAT rate as it seems to be irrelevant for restaurants over time. The figure clearly shows the VAT reform

in Finland for restaurants in July 2010, marked with a solid vertical line, as the turnover reported in the second lowest VAT rate increases considerably and at the same time turnover in the standard VAT rate decreases. The remitted VAT decreases by approximately in the highest rate right after the reform and increases in the second highest rate. Similarly, for Swedish restaurant the remitted VAT at the highest rate decreases right after the VAT cut in January 2012 and rises at the second highest rate.

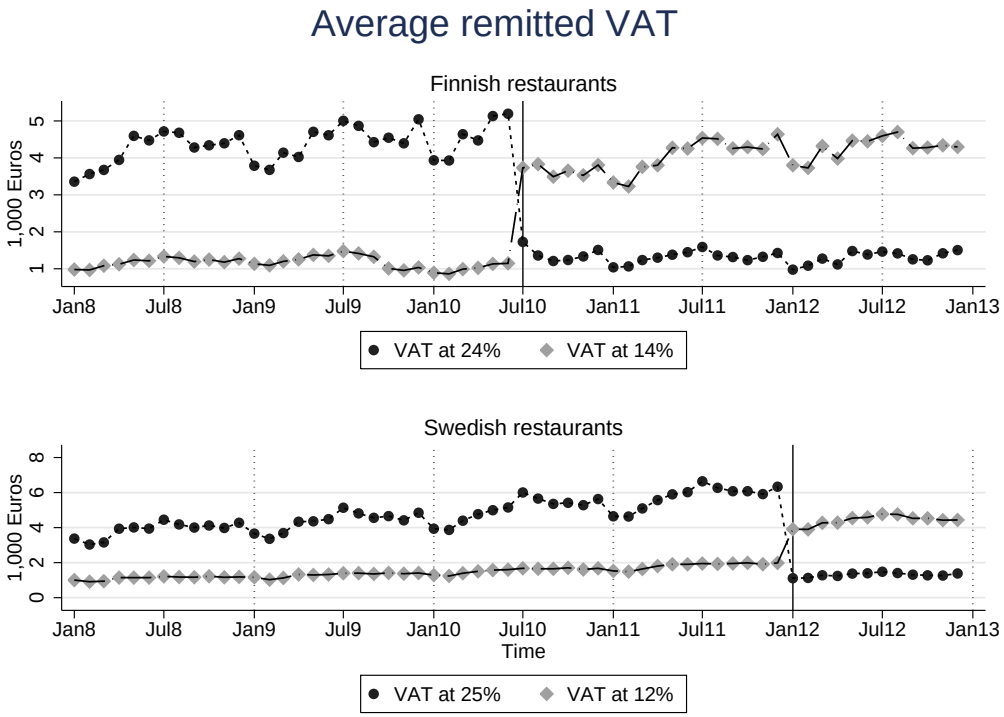

Figure 4: Average VAT remitted on different rates of restaurants in Finland and Sweden over time

In figure 5 we show how the aggregated amount of restaurants value added taxes develop in Finland and in Sweden over time. The aggregated VAT includes all taxes remitted with different tax rates. Because of the high variation in total sales within year, we also include linear fits before and after the reform separately. This is to show the change in total tax revenues. In both countries there are visible drops in the amount remitted VAT just after

the reforms, which is no surprise as the VAT rate for restaurant meals was lowered. In Sweden the drop in the amount of tax revenues is much larger than in Finland, which is at least partly explained by the larger reform. Also, it is evident that the size of the industry is much bigger in Sweden than in Finland.

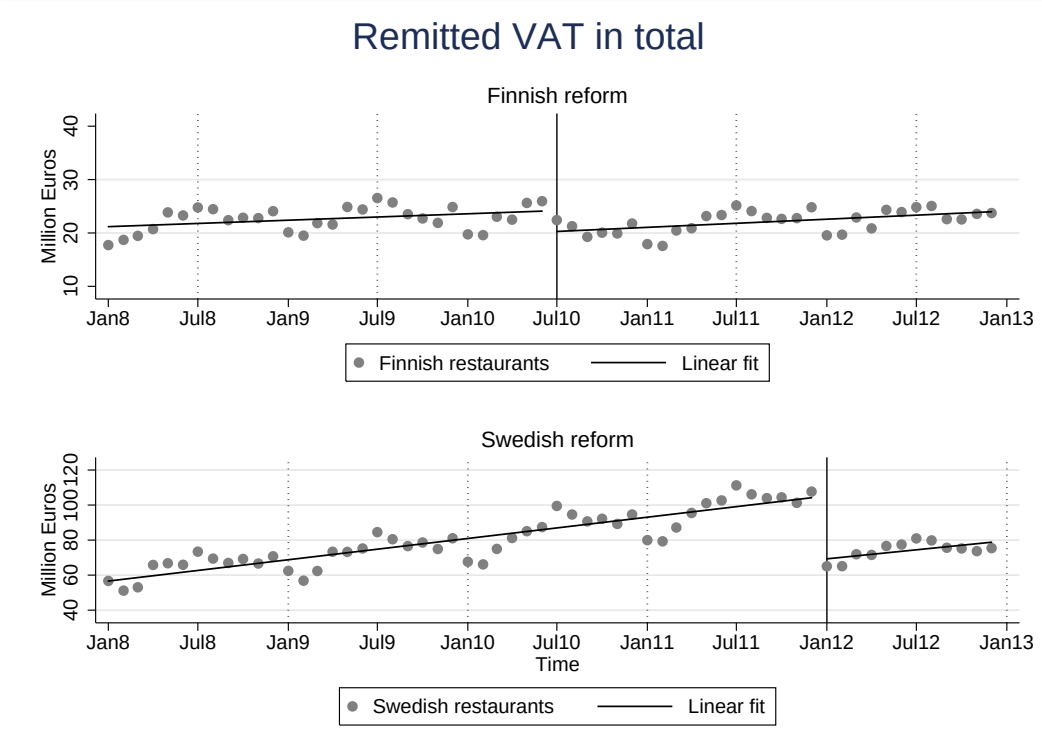

Figure 5: Total VAT remitted on different rates of restaurants in Finland and Sweden over time

5 Results

5.1 Price Effects

In our main price analysis we formulate a composite of the average of three main meal prices for each restaurant before and after the reform.[7] Therefore,

[7]If we have less than three meal prices for an individual restaurant, we use only one or two prices as a composite meal.

the following graphical analysis of relative changes in consumer prices shows the changes in this variable. We construct this composite meal in order to avoid being overly dependent on the changes in individual meal price. By constructing a composite meal we can examine the entire change in a restaurant menu more precisely.

We use equation (2.1) to calculate the relative price change for each firm. The relative price change denotes the percentage change in the consumer price after the reform compared to the price level before the reform. Thus we can show the whole distribution of price changes, which gives very explicit evidence of how prices have changed.

In the upper panel of figure 6 presents the relative price changes as a composite in Finland and Estonia. Similarly, the lower panel shows the distribution of relative price changes in composite prices of restaurant meals in Sweden and Finland. The vertical line represents the location of full pass-through in both graphs, which is -7.4% in Finnish reform and -10.4% in Swedish reform. A substantial proportion of restaurants did not change their prices at all in both reforms, the zero relative change in the figure. This indicates that over half of the whole sample of restaurants in Finland did not change their prices as a result of the VAT cut and even more in the case of Swedish reform. However, there is a distinctive peak at the level of full pass-through in Finland right after the reform. These restaurants shifted the entire tax change to their prices. However, similar change is not visible for Swedish restaurants after Swedish reform. It even seems that most of the Swedish restaurants ignored the reform as they behaved as restaurants in the control group.

We employ a natural experimental method to estimate the average price effects of the VAT reform. The dependent variable is the log of composite price, including 3 prices from the same restaurant before and after the reform. All estimates are differences-in-differences (DD) results comparing Finnish restaurant prices in the treatment group with several control groups over time.

Table 4 presents the results on prices. The table shows comparisons of Finnish restaurant meal prices with Estonian restaurant meal prices in column (1) before and after the Finnish reform, in column (2) we use Finnish hotel room prices as a comparison group, and in column (3) we apply Norwegian meal prices as a control group. And similarly for the Swedish reform, column (4) compares Swedish restaurant meal prices to Finnish meal prices, column (5) uses Swedish hotels as a comparison group and finally, in column

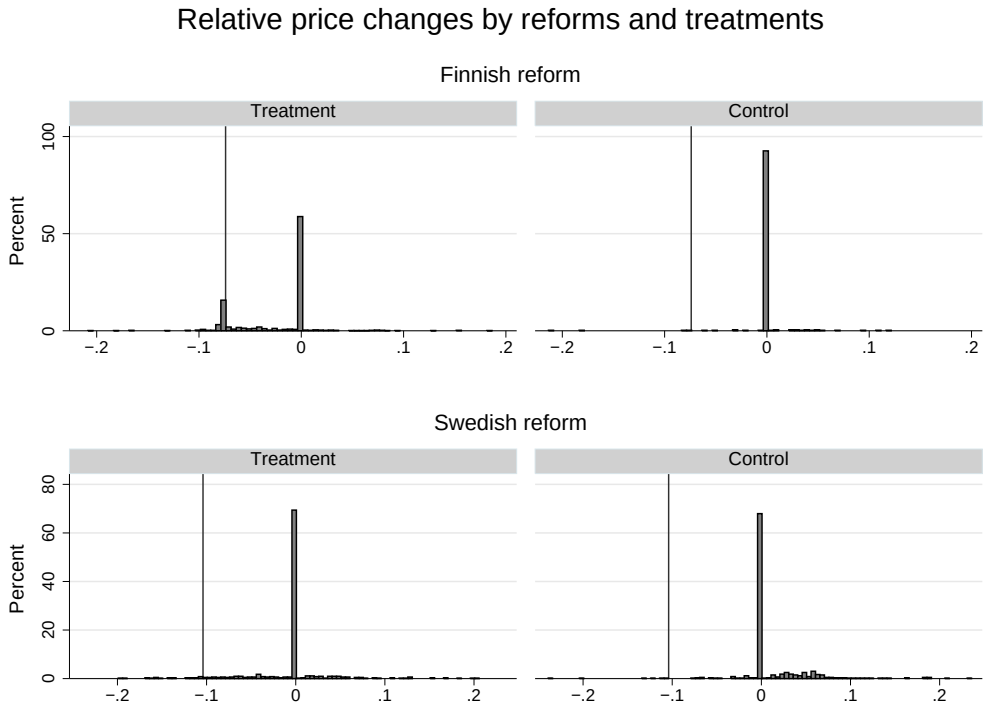

Figure 6: Distribution of relative price changes in Finnish and Estonian restaurants

(6) Norwegian restaurant meal prices are used as a control group. All the estimations are made by using the fixed-effects model.

Our main result for Finnish reform is that there is only a minor decrease in prices right after the reform. The unweighted meal prices fell by 2.2% as a result of the VAT reduction when we compare them to Estonian meal prices. The response in column (3) is a bit larger, when we compare the meal prices to hotel room prices, -4.7%. This results is somewhat dependent on few price observations and overall the variation in hotel room prices is much larger than in meal prices. However, the response is not statistically different from the baseline estimate in column (1). We can draw a similar conclusion from the Swedish reform, the meal prices decreased only by a little after the VAT cut for restaurants. In Swedish case the price reduction seems to even smaller, 2% in our baseline model, although the VAT cut was

larger than what it was in Finland 1,5 year before. Thus, it seems that many restaurants did not change their prices at all after the VAT cuts. This was evident already from figure 6 where it was very visible that high fraction of all restaurants in our sample did not change their prices at all in a response to the reform.

We present the weighted fixed effect results in Table 5. The weighted results aim at measuring the price change for a representative consumer. With this weighting we also take into account the heterogeneity in restaurant sizes. We use turnover statistics for 2010 to construct the weights. In practice we construct a categorical variable of 10 size groups to weight the results. We do this because the CPI data for Norwegian restaurants contain only this kind of categorical variable without information about the exact numerical value of yearly turnover.

The dependent variable is again the log of composite price. The order of table is exactly the same as in table 4. The overall result is that weighting by restaurant size categories leads to larger price change estimates than without weights when we examine the Finnish reform. These results suggest that relatively larger restaurants reduced their prices more than smaller ones. The weighting increases all point estimates compared to the unweighted main result but they are still smaller than the full pass-through (-7.4%). On average, the results suggest that the representative meal price decreased by slightly more than half of the full pass-though. However, this does not apply to the Swedish reform. The price changes are very close to the unweighted estimates.

However, there are number of caveats with these weights. The turnover statistics also include other sales than restaurant meals as long as these sales are made within the same restaurant. In some cases there are really large corporations that have a range of activities from supermarket activities to gas station operations, as well as restaurant operations. We tackled this problem by reducing the weights especially for firms that were not classified as primarily belonging to the restaurant sector. Still, the whole weighting process is somewhat ad hoc in nature, but nevertheless the best available. The weighted results should be regarded as indicative rather than precise estimates. We expect that these weighted results offer an upper bound for the actual price changes as the weighting could still be too high for large restaurants even after the corrections we make. We also have to be careful when interpreting the significance of the results as we present naive heteroscedasticity-consistent standard errors.

5.2 Demand effects

The analysis of demand and employment concentrates on the intensive margin responses only. We examine the extensive margin responses in the end, when we analyse how the reforms affected the exit and entry of restaurants.

First we need to apply some necessary data restrictions. We examine only those restaurants where over half of the turnover comes from restaurant meals. This is necessary as the industry classification is not exact enough to separate firms by the principal sales of the firms. First, the problem is that there are many restaurants with occasional operations only. The restaurant industry includes firms offering occasional catering services, bars and kiosks etc. Second, there are some large firms with a restaurant industry classification but the turnover of these firms comes from operations other than selling meals or offering hotel services. Third, there are also firms coded in different industries than restaurants but where a large share of their turnover comes from sales of restaurant meals or hotel services. The relevant data set we use when we study these responses is approximately half of the total number of the firms described in table 3. This data restriction is valid until section 5.6, where we investigate the extensive margin responses.

We start the analysis of demand effects by showing graphical evidence. Figure 7 describes, in the upper panel, the estimates of average growth in consumer price turnover one year before and after the Finnish VAT cut for restaurant industry in Finland and Sweden. The horizontal axis is in quarters from the reform, and thus zero refers to third quarter of 2010, and so on. The interpretation of the figure is as follows: if there is no changes in consumer prices and quantity of meals sold due to the reform, there is no change in the consumer price turnover. However, if the consumer prices decrease, but the quatities sold remain are unchanged, there is a decrease in consumer price turnover as well.

We estimated 2.2% unweighted pass-through to consumer prices due to Finnish VAT reduction and a bit smaller pass-through due to Swedish reform. With no changes in the quantity of services sold, we should see a similar size drop in turnover. If the quantities sold increase due to the reforms, the change in turnover would be positive or at least closer to zero than the observed pass-through to prices.

Figure 7 shows that turnover decreases after the Finnish reform among restaurants. The overall trends seem to be similar between the groups before the reform. The figure shows that there is a decrease in the growth in

turnover right after the reform among Finnish restaurants relative to Swedish restaurants. This gives us initial evidence suggesting no increase in demand for restaurant meals due to Finnish reform. This suggests that the changes in consumer prices affect strongly the turnover valued at consumer prices, which further implies that demand for restaurant meals is inelastic in respect of prices in the short run.

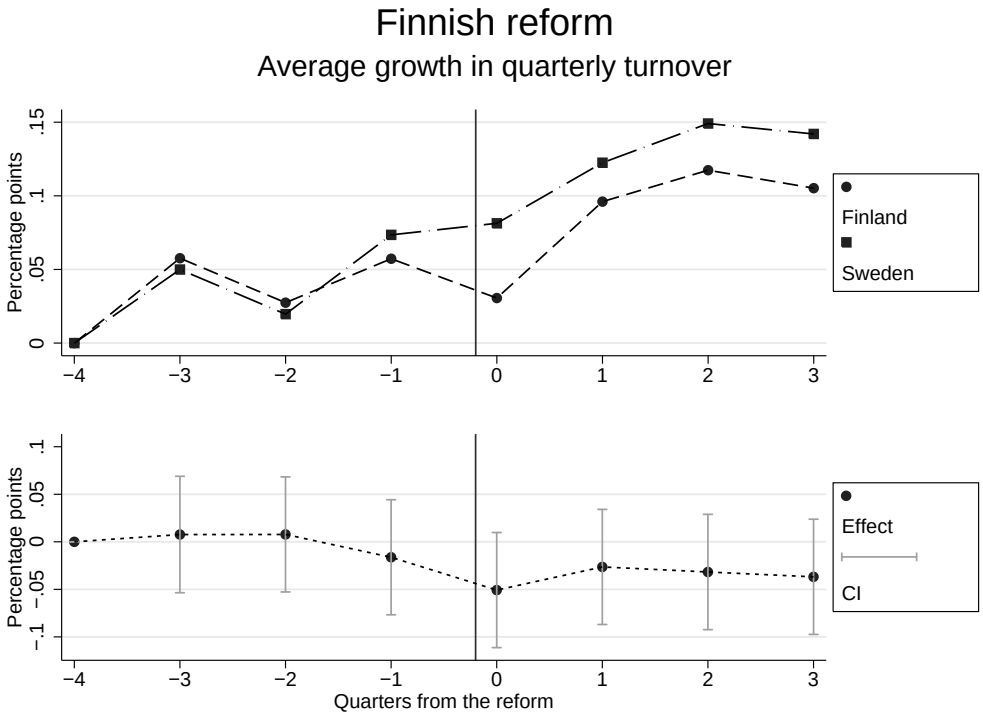

Figure 7: Average growth in quarterly turnover of restaurants in Finland and Sweden

Nevertheless, there are reasons which could dampen the size of the effect. Turnover includes sales of products and services other than restaurant meals, as figure 4 previously described. For example, the VAT rate for alcohol and drinks sold in restaurants is different than that for meals, but these goods are included in the total turnover. However, the data restrictions mentioned above diminish this problem. The changes in turnover should, however, be correct if the share of turnover coming from the other VAT bases is unchanged

due to the reform.

An additional margin of response could be a change in tax evasion in the industry due to the reform. This is not directly observable in the data and we cannot investigate this channel of response precisely. However, we can discuss the possible effects of tax evasion with respect to our results. The benefits from tax evasion decline after the reform, which could end up reducing tax evasion. A reduction in tax evasion would increase reported turnover at the lower VAT rate and turnover would also increase in response.[8] This effect would go in the same direction as the demand response and vice versa. Thus our estimate would be a lower bound for the real estimate of reported turnover and quantity changes. We discuss tax evasion issues in more detailed manner in section 5.4.

Next we show precisely similar figure around the Swedish reform, comparing again Swedish restaurants to Finnish. The overall lesson from figure 8 is similar than what we found in figure 7 for Finnish reform. There is a slight dip right after the reform in the growth of turnover among Swedish restaurants compared to Finnish restaurants. This change is smaller than around Finnish reform but also the average change in consumer prices was smaller. Thus figure 8 also indicates that there is no increase in quantity of meals sold in the restaurant sector in Sweden after the VAT cut, implying that the elasticity of demand for restaurant meals is rather inelastic.

We also estimate the effect of the reform on turnover using a similar DD strategy as we did for prices. In these estimations we again collapse the data from months to quarters and use the data only half year before and half year after the reform to diminish the variation in the data. Thus these results can be interpreted as short-run effects.

In the first column in table 6 we compare the log of turnover between Finnish restaurants (treatment) and Swedish restaurants (control) before and after the reform. The second column examines similarly the responses around the Swedish reform. The logarithmic outcome produces proportional changes and the fixed effect model controls for the history of each firm in a similar

[8]There might be some manipulation in reported VAT by firms due to the reform. Restaurants, for example, could report part of their sales at reduced VAT rate for which that rate is not applicable. We cannot observe how correctly firms apply the reporting rules in the data. However, this kind of report manipulation is illegal (tax evasion), and we think it is not a great problem for the analysis. Yet the effects on total turnover (turnover taxed at different VAT rates in total) that should provide a correct estimate if tax evasion behavior is not affected in total.

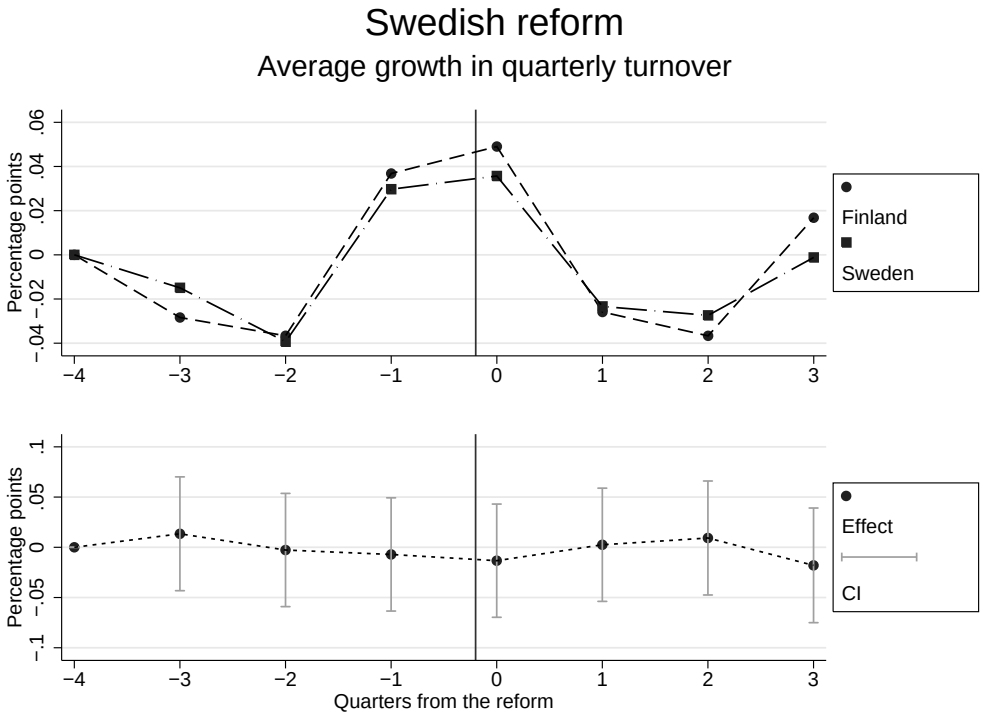

Figure 8: Average growth in quarterly turnover of restaurants in Finland and Sweden

fashion as the graphical analysis presented above.

Overall the results imply a decrease in turnover for restaurants after the reform. Column (1) shows that the turnover of Finnish restaurants decreased by 3.4% after the reform relative to Swedish restaurants. In our price analysis our baseline estimate suggested a 2.2% decrease in consumer prices for Finnish restaurants (see table 4). Thus the changes in turnover and consumer prices are very similar. This indicates no increase in the quantity of restaurant meals sold in the restaurant industry due to the Finnish reform.

In column (2) we study the effects of Swedish VAT cut similarly. The DD estimate is negative but very close to zero and clearly statistically insignificant. This suggest no changes in turnover and thus no changes in the quantity of meals sold by restaurants in Sweden after the reform. The response is smaller than in the Finnish case but also the pass-through on prices

was smaller in the case of Swedish reform. Therefore, it is no surprise that also the turnover response is closer to zero.

In summary, based on these results we may conclude that neither of the reforms did not increase the quantity of meals sold. Thus it seems that the demand elasticity of restaurant meals is rather small and even close to zero.[9]

5.3 Employment effects

We analyse the employment effects by examining the changes in firms' quarterly wage sums paid to their employees. If there are changes in the number of employees or in the salaries of existing employees, we should observe it with this variable. One of the EU's main reason for allowing reduced VAT rates for labor-intensive industries was to stimulate employment. Thus, from a policy point of view, it is highly relevant to study also these effects.

We start again with graphical evidence. Figure 9 describes the changes in monthly wage sums similarly as we described in figure 8 for turnover. The trends in the changes in these two figures are a bit different between countries. It seems that the growth in wage sums is faster in Sweden than in Finland. However, there is no clear change in the trend of restaurants' wage sums right after the reform. It even seems that the average change in wage sums for Finnish restaurants decreases slightly in the second quarter after the reform (quarter 1 in the graph). Therefore, based on the graphical evidence, we do not detect any clear changes, on average, in restaurant wage sums due to the Finnish VAT reform for restaurants.

We continue to show similar wage sum analysis for Swedish VAT cut for restaurants in figure 10. Similarly as before, the trends are a bit different between countries in wage sums. However, the main message from the figure is similar that it was in the case of Finnish reform. There is no clear change in the trend among Swedish restaurants right after the reform. Therefore, the graphical analysis seems to suggest no changes in wage sums after both reforms. This implies that the employment in the industry or the level of wages paid to restaurant employees did not increase due to the reforms.

[9]The results survived a battery of robustness checks. For example, placebo treatments using the same method and the data from the year 2009 produced zero results. This also suggests that the main assumption of the DD method, parallel time trends between groups, is satisfied. In addition, we added yearly level control variables to the specifications but these did not change the results.

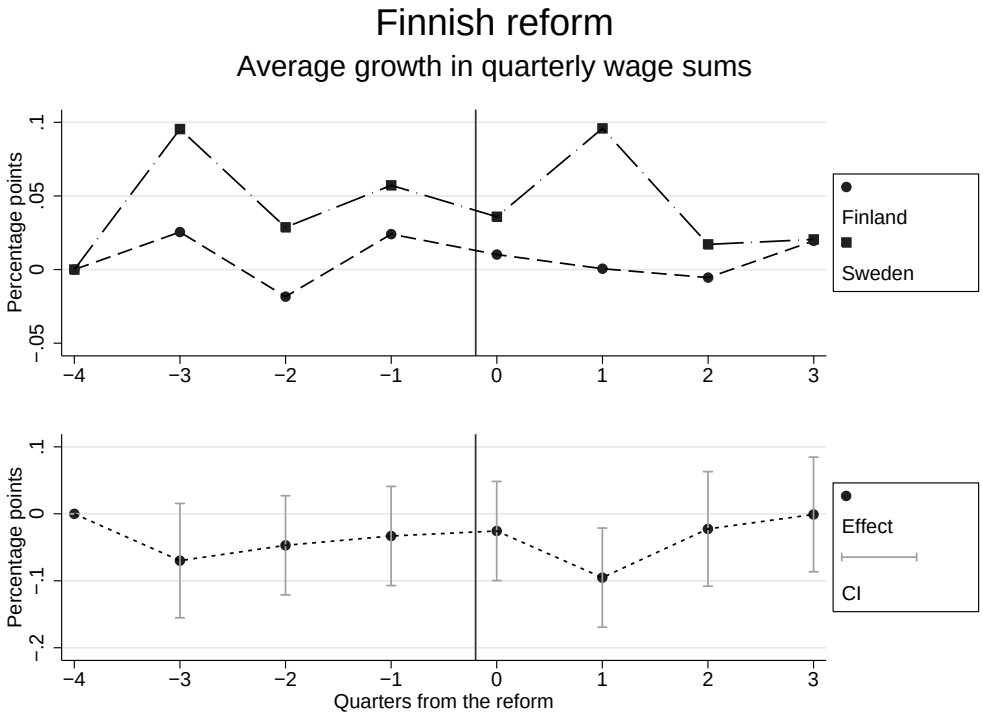

Figure 9: Average growth in quarterly wage sums of restaurants in Finland and Sweden

We also estimate the effects of the reform on wage sums using the DD approach. In the first column in table 7 we concentrate on the Finnish reform where the treatment group is Finnish restaurants and control group is for Swedish restaurants. The results in the second column are for Swedish reform where the treatment group is Swedish restaurants and control group is for Finnish restaurants. In these estimations we use data on half year before and after the reform. We aggregate the data into quarters and use the log of wage sums as a dependent variable.

There are no statistically significant changes in the wage sums of restaurants due to the reform. The DD estimate is even negative for Finnish reform. However, the estimate is clearly insignificant. The negative point estimates suggest that restaurants did not, at least, increase their wage sums due to the reform.

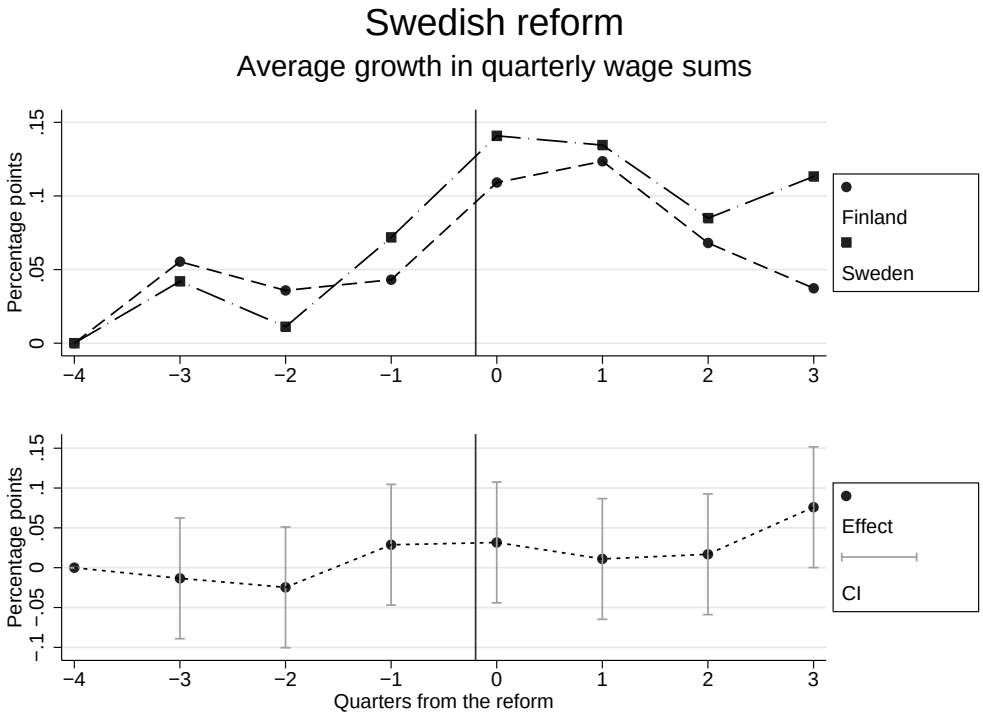

Figure 10: Average growth in quarterly wage sums of restaurants in Finland and Sweden

In second column we estimate the wage sum changes around the Swedish reform. The estimate is positive but not statistically significant. It suggests that there is no statistically significant increase in wages paid to the employees of restaurants. The results for wage sums imply that the main aim of the EU policy to increase employment by allowing restaurants to apply lower VAT rates was not fulfilled.

5.4 Tax evasion

One important and interesting margin of response for firms is how the tax rate and VAT especially affects the amount of tax evasion. In general, the tax evasion is challenging subject to study empirically as the amount of evaded taxes is not directly visible in any data.

However, there is something we can say about the effects of the reforms

on tax evasion based on the results we have found thus far. The logic is as follows. As discussed shortly in section 5.2, the benefits from tax evasion decline after a decrease in VAT rate for meals in the restaurant industry. This could then end up reducing tax evasion. We would observe a decrease in tax evasion in the data as an increase in reported turnover.[10] Therefore, we are able to use our previous estimates to give suggestive evidence of tax evasion responses.

From the previous price analysis we learned that consumer prices decreased only by little after VAT decrease in Sweden. Thus there are two additional channels that can affect the development of reported turnover showed in figure 8, changes in quantity of items sold and tax evasion. The figure illustrated no change at all in turnover after the Swedish reform. Thus we can conclude that there are no statistically or economically significant changes in neither quantity of meals sold or VAT evasion.

Figure 7, instead, showed a decrease in turnover after Finnish VAT reduction. Nevertheless, the change in the growth of turnover is very similar to that in consumer prices and thus the results suggest no changes in quantities or in the amount of evaded taxes.

In summary, as the Swedish reform had a very modest short-term impact on prices, and we do not see a significant increase in reported sales, the effects of tax rate on VAT evasion are very modest at best. Also, as the turnover changed with a similar size as the consumer prices changed after Finnish VAT reform, we can draw a conclusion that the tax evasion relating to VAT is not a huge problem in the restaurant industry.

5.5 Profit margin

Thus far the results suggest that there was only a slight decrease in prices in both countries after VAT cuts but otherwise, there was no significant effects at intensive margin. Since the VAT reductions were quite large, we should see changes in some other firm-level variables due to the reforms. One quite obvious response channel could be changes in profits. In our setting we define profits to be consumer price turnover minus wage sums and inputs. Clearly this definition is not exactly correct in a sense of accounting profits since we do not have all possible expenses (e.g. rents) to substract from turnover. However, this variable takes into account perhaps the two most important

[10] Remind also that this effect goes to the same direction as the demand response.

expenses for restaurants, wages and inputs.

Figure 11 describes the results. It seems that right after Swedish reform the profits of restaurants suddenly increase, but there is no similar exceptional change among Finnish restaurants after VAT cut. These results are not very surprising if we take into account the results thus far. As we observed a decrease in consumer price turnover among Finnish restaurants after VAT cut and a smaller decrease among Swedish restaurants, it is expected to see an increase in profits among Swedish but not as clear increase among Finnish restaurants.

5.6 Entry and exit

An additional channel of response could be in extensive margin. The costs of entering the market decreased due to the reforms, and this might have stimulated new businesses. In addition, the reforms, of course, also decreased the costs of operating firms in the industry, and thus could have revitalized those businesses struggling in the restaurant sector, resulting in a decrease in exits. Thus, to provide a conclusive analysis, we study the number of new entries and exits of Swedish and Finnish restaurants over time. This is possible as we have the total data for all restaurants in the industry which are obliged to register with the tax authority. Our hypotheses are that we should observe an increase in the entry of new restaurants in the industry and/or a decrease in the number of exits. In this section, we only emphasise the graphical evidence.

First, in Figure 12 we show how many entries and exits there are per quarter of year. It would seem natural for the number of entries and exits to be higher in Sweden than in Finland as the industry size is larger in Sweden. The figure indicates that the number of entries roughly equals the number of exits in both countries, leaving the total number of firms largerly unchanged. The figure already suggest no clear changes after reforms (vertical lines in the figure).

To study further the possible effects of the reform, we also plot the probabilities of exit and entry in Figure 13. Both the exit and entry probabilities seem to be relatively stable over time, although the last quarter in each year seems to have much more exits than other quarters. In the lower panels in both figures we also compare the probabilities of exits and entries between Swedish and Finnish restaurants. The plotted estimation results confirm that neither the number of entries nor exits changed after the reforms. However,

it is still possible to have changes over a longer period of time.

6 Conclusions

We examine the effects of VAT reductions on restaurant meal prices, demand and wage sums paid to employees in Finland and Sweden. The VAT rate was reduced from 22% to 13% from the beginning of July 2010 in Finland and from 25% to 12% at the beginning of January 2012 in Sweden. The EU Member States were allowed to apply reduced VAT rates for restaurant services one year before the Finnish reform (CD 2009/47/EC). We argue that these reforms are exogenous, since it was because of the EC Directive that the governments chose to apply reduced VAT to the restaurant industry rather than other similar industries. Therefore, we have an interesting opportunity to estimate the effects of consumption taxes on different important margins of response.

We use an extensive amount of graphical evidence in the analysis. This is possible because we have unique firm-level price data and tax record data for monthly turnover and wage sums from both countries. With our price data, created especially for this study, we are able to show the whole distribution of price changes due to the reforms. This is not common in the previous literature. In addition, we have an opportunity to estimate rarely available margin of response in the previous literature as we approximate the changes in quantities of restaurant meals sold after consumption tax reforms. Using these information together we may draw a conclusion of the effectiveness of consumption taxes in this sector.

We make use of the standard difference-in-difference approach with fixed effects to estimate the average effect of the reform on consumer prices, demand for restaurant meals and wage sums. Our main estimate implies that the VAT reforms reduced restaurant meal prices on average by only little, approximately a quarter of full pass-through to prices.

Our results for turnover and wage sums suggest no changes in demand for restaurant services or employment in the sector. We also have graphical evidence supporting the view that turnover follows the development of consumer prices. In addition, we do not find any effects on entry into or exit out of the restaurant industry due to the reform.

These observations imply that the price elasticity of demand (quantities) is very small or even close to zero. Our estimates are in line with the paper

by Kosonen (2010) studying the effect of a VAT cut on hairdressers in Finland. Thus we conclude that consumption tax decreases for labor-intensive industries, even when as large as in this case, are not very efficient policy means for increasing demand. Also, the job creation objective of reduced VAT rates for labor-intensive industries (CD 1999/85/EC) is evidently not fulfilled.

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Appendix

	Finnish reform					
	Finland			Estonia		
Variable	Mean	SD	N	Mean	SD	N
Main Meal	11.762	7.861	3,288	6.922	4.347	1,467
Other Meal	10.783	6.581	2,654	6.720	3.982	1,476
Vege Meal	9.597	5.885	2,137	3.928	2.213	1,345
Pizza	7.962	2.344	1,561	3.137	1.794	371
Appetizer	5.381	3.048	1,834	3.576	3.507	1,268
Dessert	4.708	2.846	1,433	2.598	1.590	1,412
Lunch	8.759	3.121	1,104	3.207	1.837	535
Wine	7.817	10.234	590	3.360	5.173	632
Beer	4.445	0.931	596	2.384	1.359	851
	Swedish reform					
	Sweden			Finland		
	Mean	SD	N	Mean	SD	N
Main Meal	18.830	9.616	2,216	16.611	10.489	1,998
Other Meal	17.333	8.105	2,088	13.376	7.667	1,919
Vege Meal	13.818	6.520	1,647	15.806	17.182	1,788
Pizza	8.521	2.821	407	7.420	1.922	625
Appetizer	8.766	4.573	1,702	6.526	3.311	1,521
Dessert	7.885	2.775	1,476	6.068	2.918	1,074
Lunch	9.495	2.578	1,292	9.329	3.650	1,404
Wine	7.092	2.836	675	6.413	4.469	560
Beer	6.033	0.804	491	4.780	0.956	268

Table 1: Price data: Continuous variables

Finnish reform						
	Finland			Estonia		
Variable	Mean	SD	N	Mean	SD	N
Internet	0.748	0.434	4,091	0.780	0.415	2,601
Phone	0.252	0.434	4,091	0.220	0.415	2,601
Facebook	0.175	0.380	4,091	0.050	0.218	2,601
Chain	0.349	0.477	4,091	0.094	0.292	2,601
Mall	0.220	0.414	4,091	0.046	0.209	2,601
Union	0.353	0.478	4,091	-	-	-
Corporation	0.615	0.487	4,091	-	-	-
Swedish reform						
	Sweden			Finland		
Variable	Mean	SD	N	Mean	SD	N
Internet	0.902	0.297	3,426	0.903	0.296	2,837
Phone	0.098	0.297	3,426	0.097	0.296	2,837
Facebook	0.290	0.454	3,426	0.534	0.499	2,837
Chain	0.131	0.338	3,426	0.389	0.488	2,837
Mall	0.094	0.292	3,426	0.069	0.254	2,837
Union	0.261	0.439	3,426	0.487	0.500	2,837
Corporation	0.696	0.460	3,426	0.583	0.493	2,837

Table 2: Price data: Categorical variables

	Sweden			
	Turnover	Wage sum	Inputs	Profits
Mean	109,442	19,523	41,870	48,049
Median	37,087	1,504	14,966	16,388
SD	820,519	156,169	282,237	394,132
N	12,922	12,922	12,922	12,922
	Finland			
	Turnover	Wage sum	Inputs	Profits
Mean	120,311	25,448	46,835	48,027
Median	35,149	0	12,950	16,756
SD	1,319,370	384,621	415,369	528,589
N	5,457	5,457	5,457	5,457

Table 3: Descriptive statistics for quarterly pre-reform variables of Swedish and Finnish restaurants

	(1)	(2)	(3)	(4)	(5)	(6)
Unweighted results	Finnish reform			Swedish reform		
Control	Est	Hotels	Nor	Fin	Hotels	Nor
DD	-0.023***	-0.044**	-0.028***	-0.020***	-0.006	-0.013**
	(0.003)	(0.010)	(0.005)	(0.003)	(0.007)	(0.005)
After	0.000	0.024***	0.017***	0.014***	0.000	0.008*
	(0.002)	(0.004)	(0.004)	(0.002)	(0.007)	(0.004)
Specification	FE	FE	FE	FE	FE	FE
N	2,410	2,174	2,574	2,448	1,460	2,062
R^2	0.169	0.097	0.050	0.047	0.006	0.006
N of firms	1,205	1,101	1,287	1,224	739	1,031

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Main estimation results. Differences-in-differences estimates of prices.

Note: The dependent variable is the log of the composite price variable. The standard errors are calculated by using country or industry clusters with a block bootstrapping method.

	(1)	(2)	(3)	(4)	(5)	(6)
Weighted results		Finnish reform			Swedish reform	
Control	Est	Hotels	Nor	Fin	Hotels	Nor
DD	-0.029***	-0.052***	-0.046***	-0.018***	-0.001	-0.011*
	(0.002)	(0.005)	(0.005)	(0.003)	(0.008)	(0.005)
After	0.001	0.024***	0.018***	0.012***	-0.004	0.005
	(0.002)	(0.004)	(0.004)	(0.002)	(0.007)	(0.005)
Specification	FE	FE	FE	FE	FE	FE
N	2,410	2,174	2,574	2,642	1,460	2,062
R^2	0.272	0.145	0.081	0.024	0.007	0.005
N of firms	1,205	1,101	1,287	1,321	739	1,031
Standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Table 5: Estimation results weighted by turnover

Note: Fixed effects DD estimates where the dependent variable is the log of composite price variable. The estimates are weighted by the annual turnover of 2010. The heteroscedasticity-consistent standard errors are in parenthesis.

	(1)	(2)
VARS	Finnish reform	Swedish reform
DD	-0.034***	-0.000
	(0.008)	(0.007)
After	0.153***	-0.086***
	(0.005)	(0.006)
N	55,448	66,752
R^2	0.034	0.013
N of firms	13,862	16,688
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Table 6: DD estimation results: Turnover

Note: Fixed effects DD estimates where the dependent variable is the log of consumer price turnover. The standard errors are calculated by using industry-level clusters with a block bootstrapping method.

	(1)	(2)
VARS	Finnish reform	Swedish reform
DD	-0.020	0.019
	(0.031)	(0.027)
After	0.147***	-0.047**
	(0.016)	(0.023)
N	32,284	40,944
R^2	0.004	0.004
N of firms	9,578	11,853

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: DD estimation results: Wage sums

Note: Fixed effects DD estimates where the dependent variable is the log of wage sums. The standard errors are calculated by using industry-level clusters with a block bootstrapping method.

Table A1: Desciptive statistics for CPI data from the statistics offices of Sweden and Norway (in euros)

Sweden			Norway		
Variable	Mean	N	Variable	Mean	N
Dinner1	42.41	84	Beef	8.95	36
Dinner2	32.28	63	Salmon	21.74	138
Dinner3	24.37	93	Salad	14.58	165
LunchA	9.70	115	Pizza	15.06	144
LunchB	10.34	59	Sandwich	5.97	202
Lunch Fish	14.26	49	Soup	11.15	92
Wine	29.31	117	Wine	8.91	310
Beer	6.32	117	Beer	8.05	220

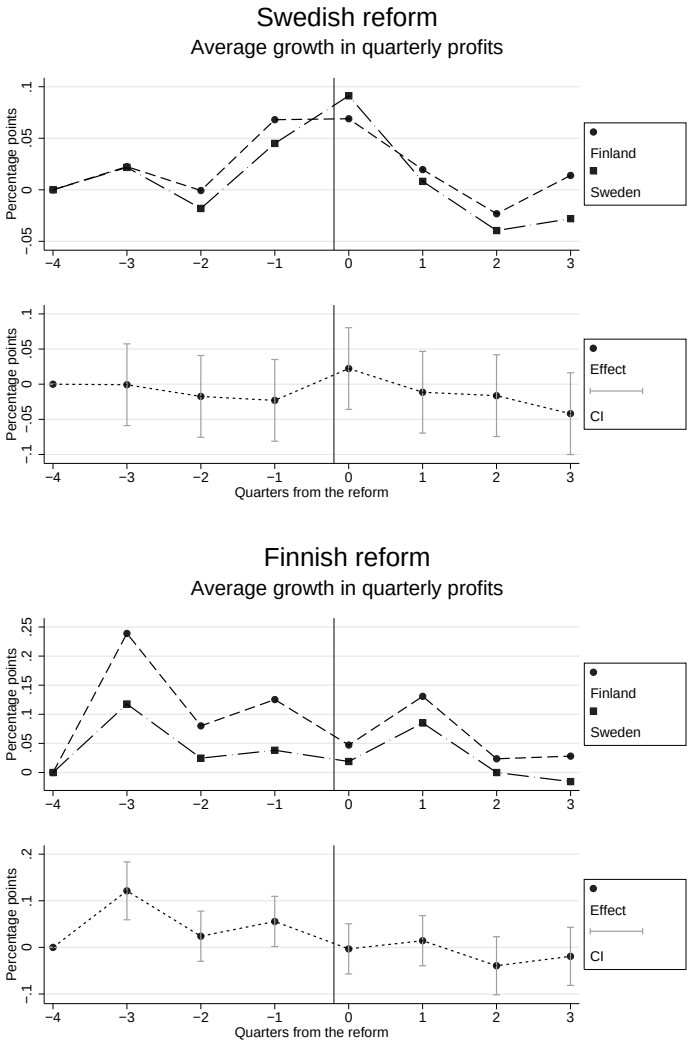

Figure 11: Average growth in quarterly profits of restaurants in Finland and Sweden

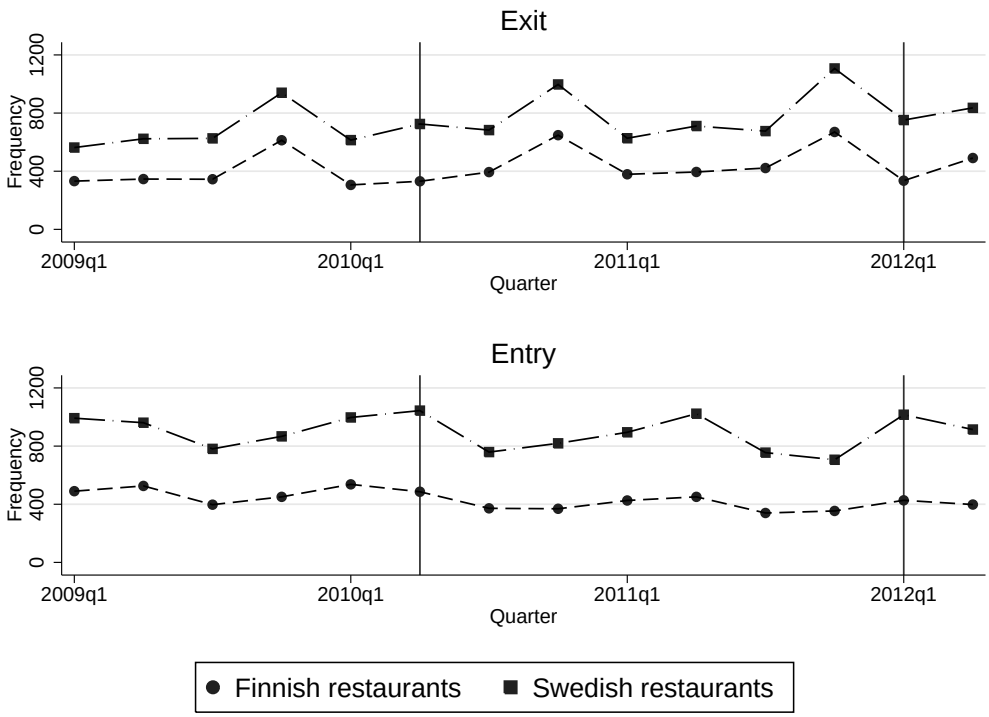

Figure 12: Number of exits and entries: Swedish and Finnish restaurant industries

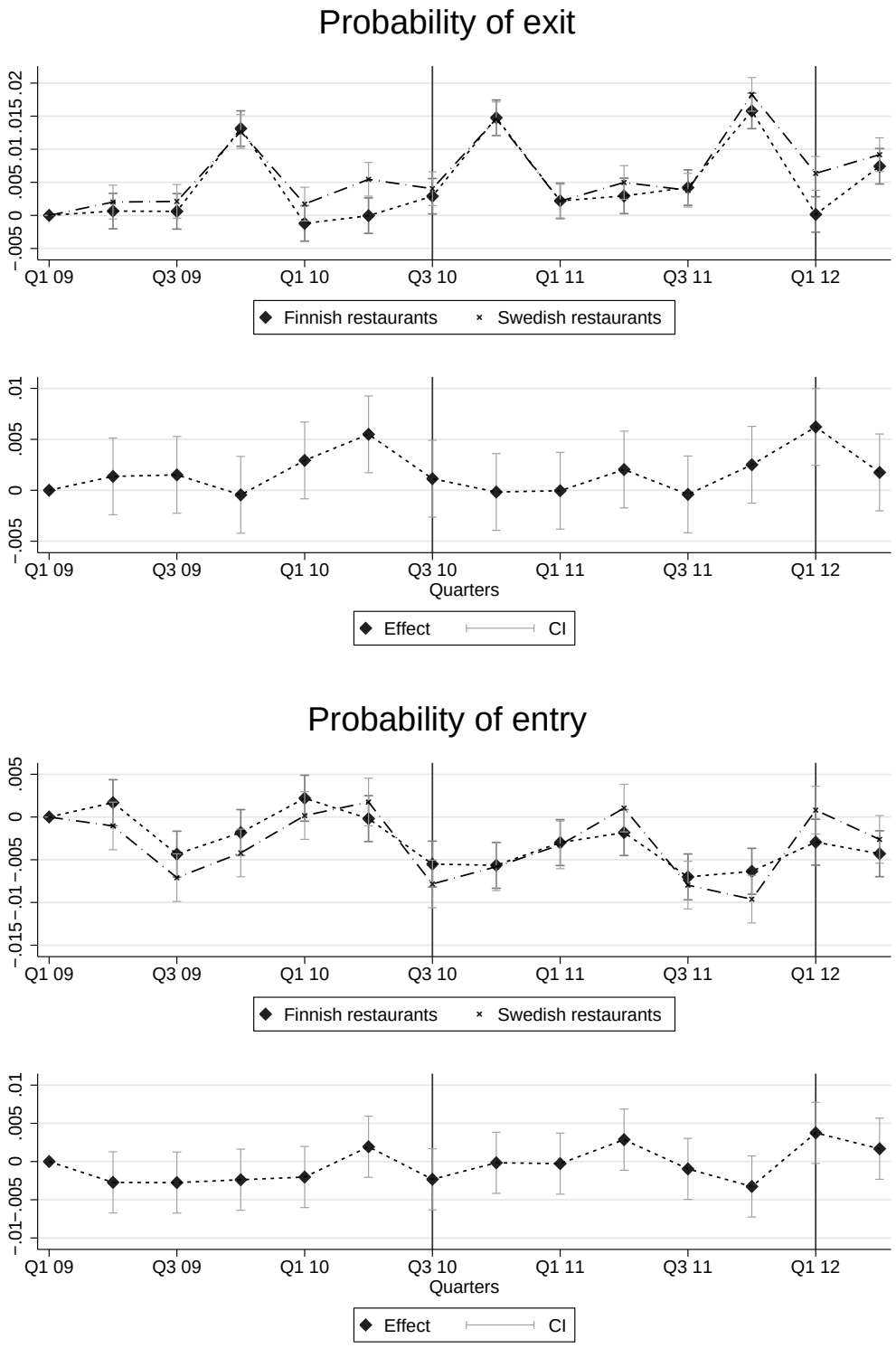

Figure 13: Probability of exit and entry: Swedish and Finnish restaurant industries

Table A2: Placebo results

	(1)	(2)	(3)	(4)
	Finnish reform		Swedish reform	
VARS	log turnover	log wage sums	log turnover	log wage sums
DD	-0.015*	0.024	0.005	0.009
	(0.009)	(0.018)	(0.007)	(0.027)
After	-0.021***	0.049***	0.131***	0.136***
	(0.005)	(0.010)	(0.006)	(0.023)
N	53,570	32,284	65,140	40,944
R^2	0.001	0.001	0.031	0.006

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1