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Does VAT Cut Appear on the Menu? The Consumer Price Impact of Hungarian VAT Decreases of 2016-2017

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The Consumer Price Impact of Hungarian VAT Decreases of 2016–2017

Summary: To understand the economic impacts of VAT changes, the passthrough to consumer prices should be analysed. The main objective of the study is to examine passthrough with the rarely used method of synthetic controls for Hungarian VAT changes in 2016–2017. Synthetic price indices are created from the price indices of the same consumer expenditure categories of different European countries. The study finds almost full passthrough in case of pork and chicken, while the passthrough is only partial for fresh milk and eggs. The primarily analysed Hungarian VAT changes of 2016–2017 have not been reflected in the consumer prices of the restaurant sector at all. The price impacts for food items are in line with the experiences of the Romanian decrease of VAT in 2015. Analysing the earlier Hungarian and international passthrough rates of the restaurant sector with the synthetic control method, we can state that this sector is characterized by strong asymmetric passthrough. VAT increases are fully transferred to consumer prices while this is not the case for VAT decreases.[1]

Keywords: VAT, passthrough, synthetic control, regression

JEL codes: H2, H20

In Hungary, VAT rates changed significantly in 2016 and in 2017, which allows for the study of a highly researched area, which is also of high interest to the public: the price impacts of VAT changes. Policy-makers often argue that VAT changes stimulate the economy or certain sectors, or serve social purposes, but this is probably not always the case, as our study shows. There is another reason why analysing price impacts is important: in addition to international empirical literature, it serves as a basis for predicting the effects of future VAT changes. The passthrough of VAT changes is an empirical fact that can provide motivation and help in theoretical research as well. If passthrough is assessed and the features of demand, supply and market structures that influence passthrough are explored, it can contribute to planning VAT changes that are optimal from a social policy viewpoint as well. To our knowledge, the price impacts of the VAT changes in Hungary in 2016 and 2017 have not yet been analysed, so our study aims to answer this question, relying on the new methodology of the 2000s, the synthetic control method. The extent of some of the VAT changes analysed is really great, 22

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percentage points (from 27% to 5%). First we review the theoretical determinants of passthrough, then we explore the potential policy objectives of VAT changes. We then go on to compare our empirical results with the findings of international literature and with the passthrough of previous VAT changes in Hungary. This way we can draw a conclusion as to the effects of the 2016–2017 VAT cuts on the real economy, especially on catering.

THEORETICAL DETERMINANTS OF PASSTHROUGH

One of the most direct of the economic effects of VAT changes is passthrough, several other effects are exerted through that. Full passthrough is when the VAT change fully shifts to consumer prices. Often just a part of the price impact can be detected at the time of the VAT rate change, and other parts appear later, gradually, or even before the change. According to Hungarian an international literature, the scale and time course of price impacts are affected by the direction of the tax change (increase or decrease), even though for a long time experts assumed that tax shifts were symmetric (Politi, Mattos, 2011).[2] The intensity of market competition and the structure of the market in the sectors concerned cannot be ignored, either: in addition to the elasticity of supply and demand of the products, market power, strategic cooperations and the level of competition all influence how VAT change shifts to consumer prices. The extent of the VAT change may also be important, as a significant change may, through psychological factors, trigger disproportionately strong reactions in market operators, while a less substantial VAT change may not shift to prices at all. Behavioural aspects include the date when the changes are announced and the timeframe of their imple-

mentation, as these influence prices through expectations. Based on theories explaining passthrough, *Table 1* shows the most important factors affecting this phenomenon.

ECONOMIC EFFECTS AND POLICY OBJECTIVES OF VAT CHANGES

A general change in VAT rates, and the extension or restriction of the scope of reduced rates definitely affect the income and consumption of economic operators. A basic question is whether the change – e.g. a reduced rate is applied to a product category – shifts to consumers prices or not. If yes, it is primarily the behaviour and consumption pattern of the product's consumers that may change. If not, the profitability of selling the product will change, which, ultimately, may be reflected in the profit of the owners and/or income of the employees. As a result, passthrough is not a necessary condition for economic effects.

If VAT changes shift to prices, demand-side reactions are to be expected (Copenhagen Economics, 2007). Changes in demand may vary by income level and product type as well. In addition to the change in price, demand for a given product is also influenced by how the price of other products have changed, how total purchasing power has been affected by the VAT rate change, and how flexibly the demand for the given product reacts to changes in income. As we can see from the findings in international literature, the own-price elasticity of food items is negative, but has a low absolute value, which means that in case of a price increase, consumption decreases, but to a lesser extent (Menezes et al., 2011). This international observation is substantiated by three analyses with regard to Hungary. In Hungary, estimations were made in 2013 with the ECONS-TAX model, while *Cseres* and *Gergely* (2008 and 2016) an-

DETERMINANTS OF PASSTHROUGH

Determinant	Description
Demand elasticities	Demand elasticities are important determinants of passthrough. When demand elasticity is high, passthrough is lower, while in case of inelastic demand, the whole tax can be passed on to the consumers. Price elasticity also depends on income.
Consumer expectations	The demand curve represents the expectations of consumers. According to behavioural economics, it varies by market which costs consumers accept readily to be built in prices, but in general they expect to be treated fairly, and they accept increased costs (raw material prices, tax changes) as reasons for price increases, but not a wish to increase profits. Tax changes are readily accepted, and as such they provide an opportunity to introduce price increases that have been postponed.
Supply elasticities	High supply elasticities will create larger effects on prices and production. In the short run, supply curves may have upward boundaries so that positive demand effects cannot be satisfied. Thus, a VAT reduction could lead to no short-run effects, even if it led to a price decrease.
Market structure	Stronger competition leads to more significant passthrough. A VAT increase may provide an opportunity for companies to attempt to push competitors out of the market, and to this end, they may not increase prices immediately. Pricing also depends on the level of cooperation on the market. Market power also determines fundamentally if a company can keep its prices above marginal cost in the long term.
Level of integration in the supply chain	If the supply chain is fragmented, certain market operators with less significant market power in the chain may cause significant distortion, their effects may add up. Double marginalization is a phenomenon that happens when there is no perfect competition between the members of the chain (Berezvai, 2018).
Market size	Exposure to international markets may also affect passthrough mechanisms, like the accession to the EU in Central Europe in 2004.
Cost structure of companies, the shape of the cost curve	According to scientific literature, cost structure also affects supply-side behaviour. The cost curve may be non-linear, and in this case, according to Berezvai (2018), more complex examinations are necessary.
Menu costs	Menu costs introduce a limit in pricing decisions, as changing prices and displaying new prices also cost money. As a result, if the VAT increase is smaller than menu costs, there will be no passthrough – this is an example of price stickiness. According to Jonker et al. (2004) prices are the stickiest in small firms.
Administrative costs	If legal regulations are complicated, it is not only a problem for customers, but it also results in a tendency on the supply-side to leave prices unchanged. Especially if the VAT reduction is only temporary.
Weight of the product category	If the weight of the product in the consumer basket is low, the consumer commits less resources to finding the cheapest product, which results in less intense competition and lower passthrough. The demand elasticity of narrower product categories is higher, this may also decrease passthrough.

Determinant	Description
Distinguishing product categories	If it is easy for consumers to distinguish products that are affected by the VAT change, it may lead to a larger price impact. If it is not clear which products are included in the VAT reduction, the price impact is lower.
Psychological factors	Demand-side reactions to price changes are also determined by psychological factors. For example, demand may disproportionately react to significant price changes.
Relationship of trust	Close seller-customer relationships with local suppliers also increase passthrough and limit the monopolistic situation of the supply side to maintain trust in the long term. This monopolistic situation is caused by the fact that local suppliers often have great market power due to travel and transport costs. According to Crosby et al (1990), it is in the interest of both the seller and the customer to have agreements based on mutual trust.

Source: Copenhagen Economics (2007), Melioris and Sramkova (2015), Dijkstra et al. (2013), Jonker et al. (2004) and Berezvai (2018)

alysed price elasticities on cross-sectional and panel data with the QAIDS model. All three studies found that the own-price elasticity of food items is negative, but has a low absolute value. This means that consumption decreases only slightly as a result of price increases (Cserháti and Keresztély, 2017). Households try to maintain the level of food consumption regardless of price changes, which also means that the increase in the price of food decreases the consumption of other product groups. This is caused by the income effect: if consumers wish to maintain their previous level of food consumption when prices have gone up, they will simply have less money for buying products from other groups (Green et al., 2013). The own-price elasticity of food-stuff decreases as the proportion of food in total expenditure increases, since narrower categories always have better substitutes. Income elasticity increases as the consumption category increases, since the amount spent on consumption categories that are less significant compared to the income is not determined by income, but by other factors.

The distributional effects of VAT rate changes can be detected more clearly (Copenhagen Economics, 2007). Even if changes are properly targeted (the VAT rate is reduced for a product that poor households consume in larger proportions), the amount wealthier households save this way will probably be higher, due to their higher consumption expenditure (Torres, 2015). This means that this type of redistribution is rather expensive, even if poor households can save more as a proportion of income or expenditure. VAT rate reductions targeting poor households explicitly (e.g. basic foodstuff, water supply) surely achieve the direct goal, but their effectiveness is very low, due to the factors mentioned above (Copenhagen Economics, 2007). Even though, through price impacts, VAT changes may affect the consumption structure and through that specific social goals, such VAT decreases are usually very regressive. The reason for this is that the consumption of such products and services (healthy food, culture-related products and services, environmentally friendly, energy-saving products, etc.) highly depends on the income of the individual. As a result, households with higher income, which are less price-sensitive and whose consumption is less affected by price change, typically benefit more from "consumption steering" subsidies provided in the form of VAT reductions. This

means that such measures constitute very in-effective means for supporting social goals (Chouinard, 2015).

As a result, several studies have found that from a welfare aspect, a system with a uni-form rate for every product and service with no reduced rates is better, and redistribution goals can be achieved more effectively with targeted, direct benefits. Even though the proportion of consumption taxes decrease as income increases, i.e. VAT is usually re-gressive against income, the main reason for this is the higher savings rate of households with higher income, and not a difference in the composition of consumption. This means that reduced rates can compensate this only to a limited extent, and as they become more prevalent, rent-seeking and economic distor-tions are more likely to happen. According to *Cserháti and Keresztély* (2017), these findings also apply to Hungary. In 2010 and 2017, the tax burden was the highest in the third in-come decile, while the VAT burden was the lowest in the ninth decile. Interestingly, when the different types of municipalities are exam-ined, there is negative correlation between the level of the VAT burden and the size of the municipality. Their research also highlights that between 2010 and 2017, the VAT bur-den was, basically, continuously decreasing. The only exception was the wealthiest 10% of households, where, between 2010 and 2017, there was a slight (0.07 percentage point) increase in this burden. The VAT burden is expected to decrease further in every income decile in 2018.

VAT changes may have general economic effects as well. Targeted VAT rate decreases may, in theory, under certain circumstances improve productivity and increase labour demand (mostly for low-skilled labour). The extent of the changes highly depends on the labour intensity of the sector, the elasticity of the labour market, and the balance between supply and demand on the labour market. However, it is exactly this heterogeneity that makes it difficult to draw general conclu-sions. There are few estimates about this is-sue, which suggest that the effect on output in labour-intensive sectors is rather temporary, and thus the employment impact is minimal (Copenhagen Economics, 2007).

Policy-makers often introduce VAT chang-es to achieve a certain combination of the objectives mentioned, this is why we need to know the economic effects of real VAT chang-es. In the following section, we examine how passthrough can be described as the prima-ry trigger mechanism of economic changes, based on empirical data.

PASSTHROUGH IN VIEW OF EMPIRICAL DATA

International experience

VAT changes often have partial effects. Ac-cording to *Alm et al.* (2009), in urban areas in the US, tax changes fully shift to gasoline prices, but in rural areas shifting is less than full. *Politi and Mattos* (2011) rejected the hypothesis of full shifting for 10 Brazilian food items, while *Benedek et al.* (2015) exam-ined 1231 VAT changes in the eurozone and found that around one-third of VAT changes is passed forward to consumer prices. Analys-ing two VAT rate reductions in France, *Car-bonnier* (2007) found that VAT rate shifting was 77% and 57% in the first four months for housing repair services and car sales. *Bar-bone, Sobolewski and Musters* (2015) say that in more competitive markets (air transport and railway) there is almost full passthrough, while it is only partial in road and waterborne transport. *Kosonen* (2013) studied VAT reduc-tion at hairdressers in Finland, and found that passthrough was about 50%. Results are simi-

lar for other services, such as VAT cuts in the restaurant sector (Benzarti and Carloni, 2017; Harju and Kosonen, 2014). The question arises: what are the factors behind the partial passthrough that is observed in the majority of cases?

Asymmetric passthrough is a major factor. Several studies have found a certain asymmetry, which means that in case of similar changes in VAT, increases are passed through to prices to a higher extent than cuts, i.e. the extent of passthrough also depends on the direction of the VAT change (for potential reasons, *see Table 2*). *Gábriel* and *Reiff* (2010) found that the passthrough of the 2006 VAT cut was considerably lower than the passthrough of the VAT increase of the

same year and of the 2004 VAT increase. *Benzarti et al.* (2017) studied the effects of VAT rate changes in EU member states between 1996 and 2015, and found that VAT rate increases usually shifted to prices to a greater extent than VAT cuts did. *Melioris and Sramkova* (2015), and *Benzarti and Carloni* (2017) analysed a smaller group of VAT changes in their studies and also found asymmetric passthrough. The findings of the former study suggest that in Slovakia passthrough was strong in the events of tax increases, while the impact on prices was insignificant in cases of VAT rate reductions (however, the authors add that the latter result might have been affected by the specific nature of VAT changes). Asymmetry is thus substantiated by a number

Table 2

POTENTIAL CAUSES OF ASYMMETRIC PASSTHROUGH

Factor	Description
Menu costs	If inflation is large enough relative to menu costs, firms would adjust prices upwards but not necessarily downwards in order to avoid paying any menu costs.
Loss averse firm owners	Due to the loss aversion of firm owners in a model of monopolistic competition, VAT increases are more likely to bring profit margins in the loss-domain (even if it is just the subjective perception of the owners) and are therefore more likely to trigger price changes than VAT reductions.
Fairness and consumer loyalty	Customers may accept price increases if they prevent firm profits from decreasing, but do not feel antagonism towards firms' failure to adjust prices downwards. Firms might respond to fairness considerations when setting prices because of the risk of losing some of their loyal customers.
Convex demand and/or supply curves	Depending on the curvature of the functions, large VAT changes can lead to large differences in passthrough.
Capacity constraints	Capacity constraints can lead to price rigidity. If firms cannot cater to additional demand, they may be less likely to change prices.
Collusion	If firms are able to collude, they can fully pass through VAT increases and only partially pass through VAT decreases.

Note: According to Benzarti and Carloni (2017) the first three mechanisms are plausible, and they tried to refute the other three.

Source: Benzarti and Carloni (2017)

of studies (Politi and Mattos, 2011; Jonker et al., 2004; Carbonnier, 2005, Benkovskis and Fadejeva, 2013).

There are several explanations for asymmetric passthrough. While Benzarti et al. (2017) say the causes have not yet been fully understood by science, Benzarti and Carloni (2017) present three plausible causes. First, because of menu costs, firms adjust prices upwards but not downwards, which is substantiated by *Karádi* (2016). Second, due to the loss aversion of firm owners in a model of monopolistic competition, VAT increases are more likely to bring profit margins in the loss-domain (even if it is just the subjective perception of the owners) and are therefore more likely to trigger price changes than VAT reductions. Finally, firms are not exclusively responding to demand and supply when setting prices, but they also examine how price changes are perceived and judged by customers. This is due to the fact that consumer behaviour may also be affected by fairness and loyalty towards the companies (Table 2).

Effects of VAT changes may vary over time: after a VAT cut in the Swedish restaurant sector, for instance, passthrough increased over time (Falkenhall et al. 2015). VAT reforms are often announced well in advance, which affects the expectations of market operators. According to the empirically tested theoretical model of *Buettner and Madzharova* (2016), demand for durables gradually increase between the announcement and implementation and peaks right before the VAT increase. This is followed by a significant decline in demand after the VAT increase. Their results show that, with all other factors unchanged, a 1 percentage point VAT increase leads to a 1–5% increase in sales before the implementation. Like economic effects, passthrough can also precede the implementation of the VAT change. *Danninger and Carare* (2008) stud-

ied the effects of the 3 percentage point VAT increase in 2007 in Germany, and found that cumulative passthrough was 73% over two years, and two thirds of that took place before the measure was implemented. Carbonnier (2005) helps us understand time aspects: he says that it is easier for companies to decrease output than to increase it, and this is why passthrough is partial and slow after a VAT cut, and it is immediate and higher after a VAT increase. This clearly demonstrates the link between partial and asymmetric passthrough.

Passthrough in specific product groups is highly influenced by market characteristics, e.g. the intensity of market competition. This is determined by the elasticity of supply and demand and by the structure of the market. On the market of durable consumption items, for example, there is strong international competition and a global market, which is not the case with restaurant services. This may be the reason why Benzarti and Carloni (2017) found only partial passthrough after a significant VAT rate cut in the restaurant sector in France. *Karádi* (2016) examined the effects of the 2006 VAT change on a small group of processed food items and found that there was full passthrough of both VAT increases and VAT cuts, but while the effect was immediate after increases, it was slower after reductions (approx. 3 months). Politi and Mattos (2011) rejected the hypothesis of full shifting, analysing ten Brazilian food items. These phenomena may be explained by the higher market power of service providers in case of certain services, as they may be in a monopolistic situation locally. According to *Alm et. al* (2009), for instance, the US fuel market has more monopolistic features in rural areas than in urban areas. Barbone, Sobolewski and Musters (2015) pointed out the importance of competition in passenger transport.

Passthrough is typically higher in case of

products than it is in services, because of the difference in the size of the markets and in the intensity of competition. Benzarti et al. (2017) analysed changes in Finland. In Finland, the VAT rate on hairdressing services was decreased by 14 percentage points in 2007, then it was restored to the original rate in 2012. Their results show that passthrough was immediate, and an asymmetric reaction to rate changes was still detectable after four years. Their analysis revealed a difference in the percentage of hairdressers adjusting their prices, depending on the direction of the rate change: following VAT rate decreases, 60% of the population of hairdressers kept their prices unchanged, following VAT increases this proportion was 25%. Kosonen (2013) also analysed the Finnish case and found that following the reduction of the VAT rate on hairdressing, there was only a 50% passthrough. According to Carbonnier (2007), passthrough was far from full in the first 4 months in

housing repair services and car sales after a VAT cut in France. Many studies have found partial or asymmetric passthrough in the restaurant sector (Benzarti and Carloni, 2017; Falkenhall et al., 2015; Harju and Kosonen, 2014), while *Gaarder* (2016) analysed food items and found that when the VAT rate on food items was reduced from 24% to 12% in 2001 in Norway, it was completely shifted to prices *(see Table 3)*.

ANALYSIS METHODOLOGY

Data

Our analysis relies on two data sources: the Harmonised Index of Consumer Prices (HICP) by Eurostat, and data tables of consumer price indices, weights, representative items and VAT rates, provided by the Hungarian Central Statistical Office (KSH). In

Table 3

EMPIRICAL RESULTS ABOUT VAT PASSTHROUGH

Author	Country	Product scope	Period	Results
Specific product categories				
Delipalla and O'Donnell (2001)	EU12	Cigarettes	1982–97	No full passthrough.
Alm et. al (2009)	USA	Fuel	1984–1999	Full passthrough in urban areas, partial passthrough in rural states.
Poterba (1996)	USA	Clothing	1925–39 and 1947–77	In the 1925–39 period retail prices rose by two-thirds and in the 1947–77 period there was full passthrough.
Ally et al. (2014)	Great Britain	Alcohol	2008–2011	Retailers' response to duty increases for alcohol show a certain asymmetry: passthrough of duty increases for the cheapest products is very low, while for expensive products, there is overshifting. This jeopardizes policy objectives.
Berezvai (2018)	Hungary	Fuel and alcohol	1998–2016	With beer, there is overshifting, while fuel price increase is proportionate to the increase in costs.

Author	Country	Product scope	Period	Results
Bergman and Hansen (2017)	Denmark	VAT changes of beer, soft drinks and liquors	1997–2005	Analysing three increases and three cuts regarding alcoholic and non-alcoholic beverages, they found overshifting. Passthrough is higher if the VAT-change is lower. Passthrough of increases is higher than that of cuts. Getting further from the German border, passthrough for beer and soft drinks gets higher.
Nerudová and Dobranschi (2016)	Czech Republic	Fuels	2009–2010	In case of fuels, there is overshifting. As a result, corrective environmental taxes have a significant distortive effect.
Services				
Carbonnier (2007)	France	Car sales and housing repair services	1987–1999	Findings regarding two VAT rate reductions in France: VAT rate shifting was 77% and 57% in the first four months for housing repair services and car sales. This is because the latter market is oligopolistic, while the former is closer to perfect (supply is less elastic).
Barbone, Sobolewski and Musters (2015)	European Union	Passenger transport	2001–2011	In more competitive markets (air transport and railway) there is almost full passthrough, while in road and waterborne transport it is not full, it depends on the competition.
Kosonen (2013)	Finland	Hairdressing	2007–2011	Passthrough of VAT-cuts is only about 50%. There is hardly any adjustment in the equilibrium quantity, profits increase. As a result, the effectiveness of VAT cuts in this service is called into question. There is heterogeneity in the results according to firm size.
Benzarti et al. (2017)	Finland, European Union	Hairdress-ing and more extended EU data	1996–2015	Asymmetric passthrough: at the time of VAT rate reductions, 60% of the population of hairdressers kept their prices unchanged; following VAT increases this proportion was 25%. The usefulness of consumption tax cuts for economic stimulus purposes is doubtful. What is more, once temporary cuts expire, prices can even be higher than previously, due to the asymmetry.
Benzarti and Carloni (2017)	France	Restaurant services	2004–2012	Passthrough of VAT cuts is only partial. The effect on consumers was limited, and the VAT cuts mostly benefited owners: employees received 25% of the tax cuts while suppliers received 16% and owners received 41%.

Author	Country	Product scope	Period	Results
Falkenhall et al. (2015)	Sweden	Restaurant services	2003–2013	Passthrough of the 2012 VAT rate cut is 50%. The industry is doing better, but this is less palpable for consumers. Gradually increasing passthrough increases profitability, which attracts new operators to the market.
Harju and Kosonen (2014)	Sweden, Finland	Restaurant services	2008–2013	The passthrough of VAT cuts is low, only 25%. The 2010 tax cut in Finland and the 2012 tax cut in Sweden didn't lead to an increase in either the amount of food sold or in wages. Demand for restaurants is inelastic, employment in the sector did not increase.
Basket of products				
Karádi (2016)	Hungary	Processed food	2006	Both VAT rate increases and decreases were fully shifted into prices: increases immediately, while decreases only gradually.
Politi and Mattos (2011)	Brazil	Ten food items	1994–2008	They reject the hypothesis of tax fullshifting in all cases, estimated values range from 55% for rice to 26% for bread. Passthrough is highly asymmetric. Price adjustments take place within four months.
Gaarder (2016)	Norway	All food items	2001	When VAT on food items was reduced from 24% to 12% in 2001, it was completely shifted to prices.
Benedek et al. (2015)	Eurozone	67 consumption items and 1231 VAT changes	1999–2013	On average, one-third of VAT changes is passed forward to consumer prices. To assume full passthrough is a mistake, based on the extensive analysis it cannot be assumed.
Jonker et al. (2004)	the Netherlands	80% of the CPI basket, 49 products	1998–2003	VAT increase is almost fully passed through to consumer prices. Asymmetric reactions were identified. Prices of energy and unprocessed food are the most flexible, whereas prices of services are the stickiest.
Danninger and Carare (2008)	Germany	80% of the CPI basket	2006–2007	The estimated passthrough of the VAT increase in 2007 is 73% over two years. One third took place in the year before the tax hike, and two-thirds took place at the time VAT hike was introduced. This explains why prices increased less than expected when the measure was implemented.
Dijkstra et al. (2014)	the Netherlands	93% of the HICP basket	2001; 2012	The hypothesis of full passthrough of VAT increases could not be rejected for the 2001 and 2012 VAT increases.

Author	Country	Product scope	Period	Results
Carbonnier (2005)	France	296 products	1995–2000	The analysis of three French tax reforms reveals an asymmetry: increases are fully shifted, while reductions are under-shifted.
Chirakijja et al. (2009)	United Kingdom	55% of the consumer basket	2008	In response to the 2008 crisis, a temporary, one-year reduction in the VAT rate was introduced in the country. Passthrough of the VAT cut was quick and significant, approximately 75%.
Pike (2009)	United Kingdom	55% of the consumer basket	2008	The passthrough of the temporary VAT cut was less than 50%. Later on, the price level gradually increased.
Gábriel and Reiff (2006)	Hungary	76% of the CPI basket	2004; 2006	The VAT increase was quickly shifted to prices: 70% passthrough over three months. Reaction to VAT cuts is slower and gradual, passthrough is lower than 25%, the effect is asymmetric.
Benkovskis and Fadejeva (2013)	Latvia	42% of the CPI basket	2009; 2012	Approximately 84% of the 2009 VAT increase was passed on to consumers, whereas the passthrough of the VAT cut was only 45%. Passthrough is asymmetric. The 2012 VAT cut was not passed on significantly to the prices of services, due to strong demand expectations.
Viren (2009)	European Union, Finland	Consumer prices	1970–2004	Usually two thirds of tax increases are shifted to consumer prices.

Source: Melioris and Sramkova (2015) and own compilation

our comparative analysis with other countries (synthetic control method), we use the HICP database, and we mostly rely on KSH data to identify VAT rates. We use the COICOP (Classification of Individual Consumption According to Purpose) for breaking down price indices. Analyses of these data are fundamentally determined by the degree of detail of the data available for each year. Data in the four-digit COICOP structure have been available for Hungary since 2001, and for a longer period for several countries. Many countries have started publishing price indices in the five-digit COICOP structure only recently.

Synthetic Control Method

The synthetic control method is a new methodology developed in the 2000s, and it is the most suitable tool to answer the research question of our study. Its advantage is that it is a data-driven approach that only relies to a small extent on subjective choices (Falkenhall et al., 2015). Together with harmonised indices of consumer prices, the synthetic control method provides a suitable tool for the analysis of passthrough, especially for the study of country specific, individual and one-time price shocks. Thus the method analyses the behaviour of the price index in question, and

it doesn't seek to explain VAT passthrough and its causal mechanisms (this is why fundamental determinants were presented in Table 1). This method is excellent for policy impact assessments. The application of the method is detailed in the following section.

We analyse the passthrough of VAT changes in the past two years: VAT rates were reduced on pork in 2016, and on poultry, milk, egg, Internet services, and catering supplied in restaurants in 2017 (*Table 4*).[3] In 2014 and 2015, VAT rates on live pig, half-carcasses of swine, other large animals and carcasses were decreased, but these products are not included in the consumer basket, so no data are available on their prices.[4]

The Hungarian price indices of the products concerned are compared to the price indices of similar products in other European countries. For specific products, we use countries as a control group where the changes of the price index are the closest to the changes in the Hungarian price index before the VAT cut. This weighted group of countries is selected with the synthetic control method (Abadie and Gardeazabal, 2003, Abadie et al., 2011).

Synthetic price index changes in Hungary without VAT changes are obtained from the weighted average of price index changes in countries in the synthetic control. Explanatory variables used for selecting the synthetic control for the 2017 VAT changes were quarterly price index changes from Q1 2015 to Q3 2016, the annual change in 2015 and the annual change in 2016 without the last quarter. We excluded the last quarter from the variables in order to see the effect of the VAT change in the run-up (we didn't find such effect, eventually). For pork, we only have data for one year before the VAT change, so quarterly and annual data from 2015 are included in the explanatory variables. In addition, the control group of countries were narrowed down to countries in the region in case of pork, because in the second half of 2016 the opening towards the Chinese market caused a price shock in Europe that increased the consumer price of pork only in Eastern Europe. *Table 5* shows, by product, which countries have a weight over 0.1 in the synthetic control.

To be able to compare the results with similar VAT trends in other countries, we calculated, using the same method, the passthrough of the decrease of the VAT rate on food items in Romania in 2015 and the VAT cut in catering in France, Sweden and Finland.

Table 4

VAT CHANGES IN 2016 AND 2017

Product group concerned	VAT rate before %	VAT rate after %	Month of VAT change
pork	27	5	January 2016
poultry	27	5	January 2017
Internet services	27	18	January 2017
milk	18	5	January 2017
egg	27	5	January 2017
restaurants	27	18	January 2017

Source: own compilation, based on KSH data

COUNTRY WEIGHTS IN SYNTHETIC CONTROL PRICE INDICES

	Pork	Poultry	Milk	Egg	Restaurant
Austria					0.30
Belgium			0.16		
Bulgaria	0.16	0.36		0.31	
Czech Republic		0.11	0.53	0.20	
Greece	0.22			0.34	
Poland			0.29		
Germany				0.12	0.39
Italy		0.34			
Additional countries	0.62	0.20	0.03	0.03	0.32

Note: the market is not internationally competitive in the case of Internet services, so we did not use the synthetic control method. As a result, no country weights for this are indicated in the table.

Source: own calculation

PASSTHROUGH OF VAT CUTS

The results of calculations using the synthetic control method do not provide a coherent picture: in the case of certain products there is full passthrough, with others passthrough is only partial (*Figure 1*). It might be counterintuitive, but it is a result that can be interpreted in light of economic theories and empirical findings: in some areas, prices increased after VAT cuts.

Figure 1 shows passthrough as a percentage of the VAT cut by product group, 3 months after the change of the VAT rate. (For detailed data on price indices and synthetic price index data, see *Annex, Figure 1A*.) In case of poultry and pork, there is almost full passthrough, which is similar to the effects of the 2015 reduction of the VAT rate on food items in Romania. As opposed to meat, passthrough to consumer prices was partial and slightly slower in case of fresh milk (see *Annex, Figure 1A*). Passthrough was partial in case of egg as well. In Romania, passthrough

in the product group that contained milk, egg and other dairy products was also lower than in case of meat.

The restaurant sector is special, because there the VAT cut did not shift to prices at all in Hungary, and in this product group there was a price increase in the first 1–9 months following the VAT cut. In the foreign examples of VAT rate cuts in the restaurant sector, passthrough was also low. Passthrough was almost full after the 2009 and 2012 VAT increases in Hungary, which points out the strong asymmetry in this sector, which is also substantiated by international literature *(see Figure 2)*.

Passthrough and economic consequences in Hungary, in light of Hungarian and international results

There are several similarities between Hungarian results and international, empirical results, which may help explain the great differ-

Figure 1

PASSTHROUGH AS A PERCENTAGE OF VAT REDUCTION PER PRODUCT GROUP, THREE MONTHS AFTER THE VAT CHANGE (%)
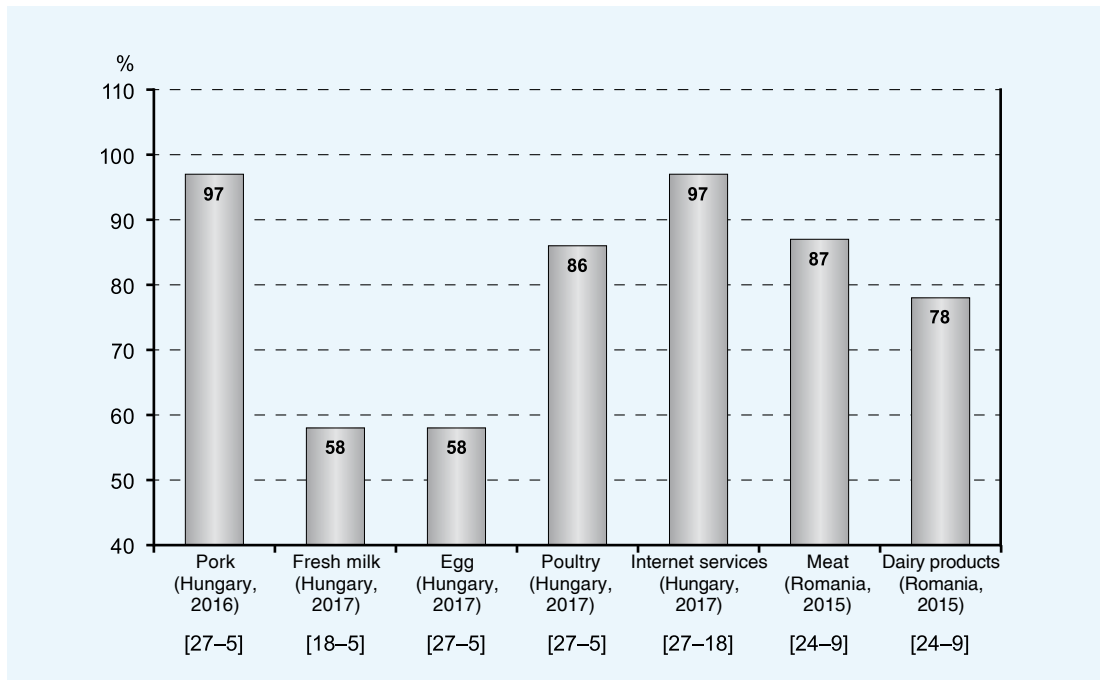
Note: VAT rates before and after the VAT rate change are indicated in square brackets.
Source: own calculation

ences in passthrough. Different trends in the price of foodstuff, durable consumer goods and services are caused by the difference in the intensity of the competition and in market structures (Table 1). As these differences are primarily caused by the characteristics of products and services sold, these findings are internationally valid.

According to Politi and Mattos (2011) VAT changes in Brazil also have an asymmetrical effect on basic foodstuff, so there are similarities between our analysis and the Brazilian authors' research. At the 2006 VAT increase in Hungary (that applied to milk, egg, bread and cereals), there was overshifting, while at the 2017 VAT cut, there was no full passthrough in case of milk. *Yang and Ye* (2008) provide an explanation, claiming that it is the theory

of search costs that cause asymmetric effects. The authors believe that asymmetric effects are strong in case of products with a lower share of the consumption of households, as the cost of search for low prices outweigh the benefits. Passthrough was further decreased in case of fresh milk by the fact that not all consumers could clearly distinguish between fresh and non-fresh milk. These assumptions are substantiated by the fact that in Romania, passthrough was higher for dairy products and egg and there the VAT cut applied to all foodstuff.[5]

According to scientific literature, demand for basic food items is usually inelastic (as for their own-price elasticity, Cserháti and Keresztély, 2017). As a result, the amount consumed is less affected by the price change

**PASSTHROUGH AS A PERCENTAGE OF VAT CHANGE IN CATERING,
3 MONTHS AFTER**
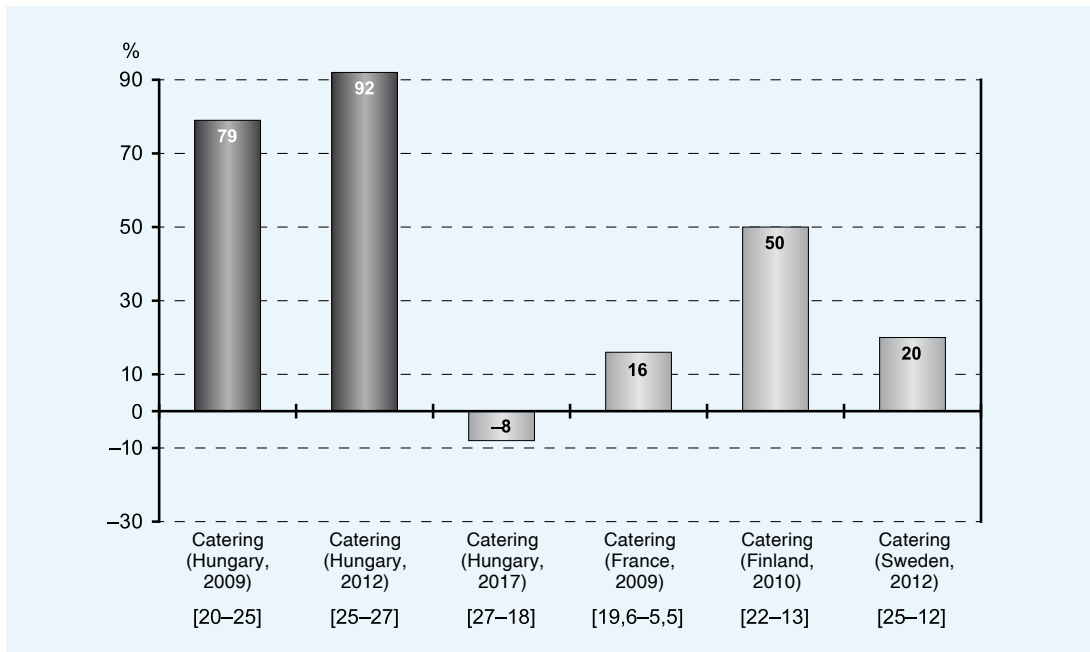
Note: passthrough of VAT increases are indicated in black, passthrough of VAT reductions are indicated in grey. VAT rates before and after the VAT rate change are indicated in square brackets.

Source: own calculation

than in case of products that are not "vital". This means that VAT revenue losses appeared at the consumers, but they didn't spend it to increase their consumption of products that had become cheaper. Cserháti and Keresztély (2017) calculated the effect of the 2016–2017 VAT changes on demand from the own-price and cross-price elasticity estimated from 2001–2015 consumption and price data: *"the selective VAT rate cuts over 2 years increased the consumption of food purchased by an estimated 0.9%. In particular, we estimate an increase over 2% in the milk, dairy product and egg product group, and a 2–3% increase among vegetables and fruit, due to cross effects."* In the other product groups, their results show that consumption probably changed only insignificantly after VAT changes, because of the

low price-elasticity of products (e.g. meat) and the cross effects between product groups (e.g. bread).

Several studies analysed restaurant services. Benzarti and Carloni (2017), *Falkenhall et al* (2015), and *Harju and Kosonen* (2014) all found low or insignificant passthrough in the restaurant sector. They believe that VAT cuts in the restaurant sector have no effect on demand or employment, which didn't increase after the VAT cuts in Finland in 2010 and in Sweden in 2012. Falkenhall et al (2015) used the synthetic control method and found that instead of the above, VAT cuts increased profitability, and according to Benzarti and Carloni (2017), the VAT cut in France primarily resulted in an increase in profits for restaurants, and, to a smaller

extent, an increase in the wages in the sector. We can assume that the Hungarian VAT cut had similar effects and what was a revenue loss for the budget, increased the profits of restaurant owners and the wages of restaurant workers.[6] The prices of restaurant services (and other products examined) may have been affected by the simultaneous increase of the minimum wage and general wage increases.

The passthrough of VAT changes described in the present study are necessary for the analysis of their economic and social effects, i.e. how economic and social policy objectives are fulfilled. It is an open research question whether in cases where there was no full passthrough (restaurants, fresh milk, egg), in which part of the production and marketing chain VAT cuts appeared and whether they had economic effects beyond an increase in profits and wages.

CONCLUSIONS

In our study, we aimed to introduce and describe the passthrough of the 2016–2017 VAT changes in Hungary. Our empirical analysis relied on the synthetic control method, a method only rarely used in literature. With this method, we established that the larger part of VAT cuts were shifted to the consumer prices of pork and poultry, and that there were similarities in this regard with the 2015 VAT cuts in Romania. Within 6 months of the implementation of the VAT cut, the price of pork significantly increased as a result of international price increases. Prices were partially affected by the decrease in the VAT rate on fresh milk and egg, but were not affected by the VAT cut in the restaurant sector at all: in this product group, there were price increases in the months following the VAT cut.

The passthrough of the VAT cut was almost full for several basic food items, even though there was no passthrough whatsoever in the restaurant sector. This draws attention to other economic mechanisms that work through the mechanism of passthrough. We find it plausible that in the restaurant sector, the VAT cut was used to increase wages and profits instead of decreasing consumer prices: this conclusion is substantiated by our study and extensive foreign literature.

Our analysis refutes the hypothesis of symmetric passthrough, popular among economists for a long time, especially in the restaurant sector. In addition, the present analysis will hopefully provide useful empirical facts for future research to rely on.

Figure 1A

PASSTHROUGH OF VAT CUTS IN HUNGARY IN 2016 AND 2017 AND IN ROMANIA IN 2015
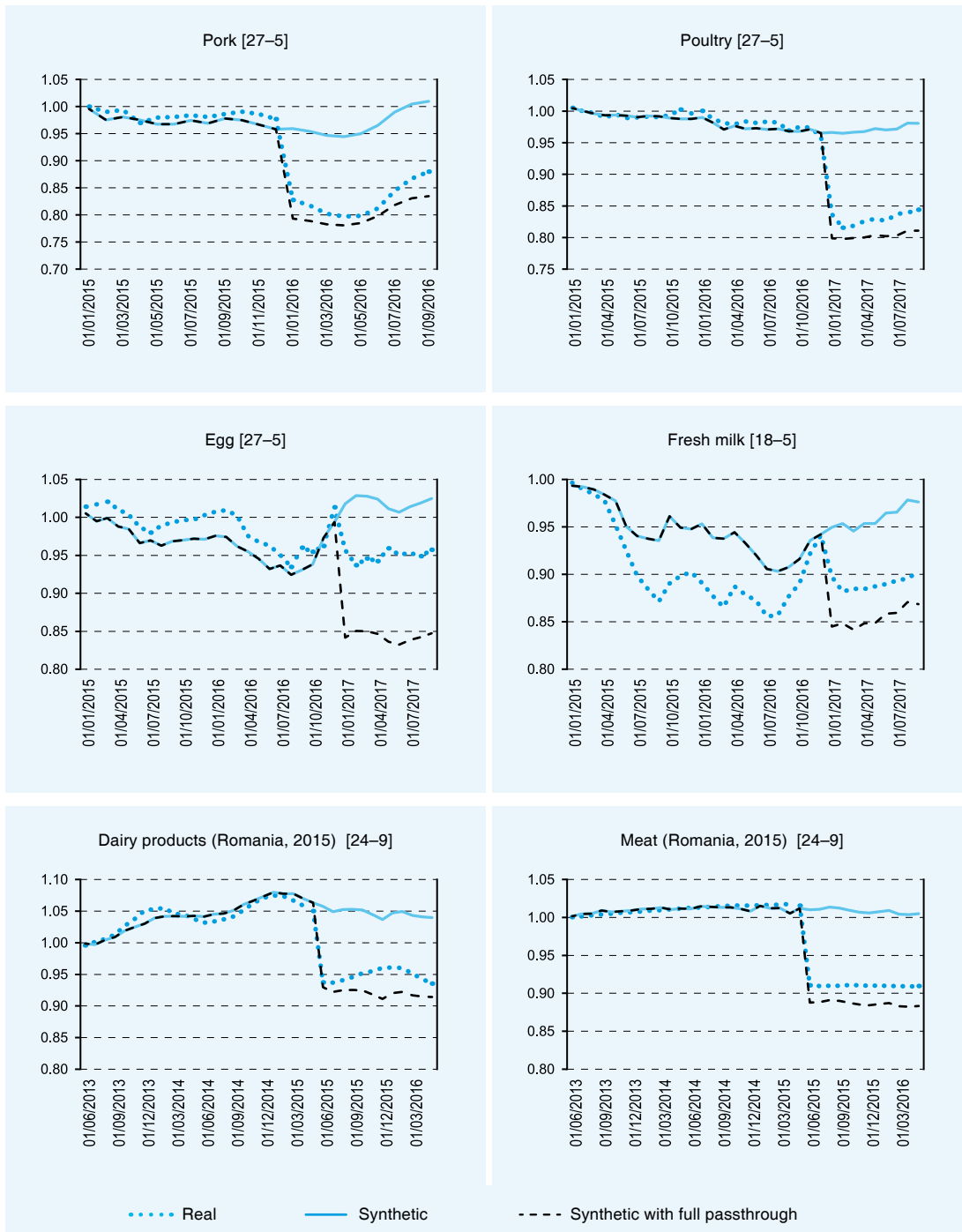
●●●● Real ——— Synthetic ‑ ‑ ‑ Synthetic with full passthrough

Note: VAT rates before and after the VAT rate change are indicated in square brackets.

Source: own calculation

Figure 1B

ASYMMETRIC PASSTHROUGH OF VAT CHANGES IN THE CATERING SECTOR

Note: VAT rates before and after the VAT rate change are indicated in square brackets.

Source: own calculation

Notes

[1] The research was conducted as part of a research project of the Ministry for National Economy. The authors would like to thank *Philippe Wingender*, tax policy expert and fiscal economist at the International Monetary Fund, for his help in finding the appropriate methodology. The authors would also like to thank *Péter Tóth,* Head of the Research Department at the Ministry of Finance, for his regular reviews of the study and for his recommendations.

[2] The prolonged announcement period of the tax measure before its actual implementation helps smooth out the inflation profile (Melioris, Sramkova, 2015).

[3] In Hungary, it was mostly the VAT rate on products with a considerable illegal market that was reduced. There is very limited reliable research on how this is connected to passthrough.

[4] In 2018, the VAT on catering provided in restaurants, on fish, and on Internet services was reduced to 5%. These changes are not covered by the present study.

[5] In 2019, the VAT rate on ESL and UHT milk will be reduced to 5% as well.

[6] Tax revenue loss caused by VAT cuts may be mitigated by the whitening of the economy. According to an expert estimate, one third of tax revenue losses caused by VAT cuts may be recovered as illegal sales drops to the quarter of its original volume (Giday, 2017). The effects of VAT rate changes on the black market are often cited in Hungary, but, according to our knowledge, no scientific analysis has been conducted so far on this issue. The public funds required for the VAT cuts we analysed were partly ensured by the decline of the shadow economy and the tax reform that had triggered this process (Parragh and Palotai, 2018).

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