WHO PAYS COMMODITY TAXES?
EVIDENCE FROM FRENCH REFORMS, 1987-1999
C. CARBONNIER (2006)

- The tax incidence analysis in this paper: investigation of the effect of VAT (value added tax) rate decreases on the share of the tax burden borne by consumers.

- Intuitively, one could think that a VAT rate change would be completely transmitted to consumers.

- However, part of the change in the tax burden can be borne by producers if the perfect competition framework is not the actual market structure. It would also imply that the tax burden as a whole is not borne only by consumers.

- Knowing who is likely to be affected by a change in VAT rate is therefore an important issue if politicians want to adequately target either producers or consumers through this fiscal tool.

THEORETICAL FRAMEWORK (1)

- p = selling price   τ = VAT rate   s = consumer share

- Producer price = $\frac{p}{1+\tau}$

- Value of the tax collected (VAT) = $\frac{p}{1+\tau}\tau$

- Elasticity of the price to the tax rate = $\frac{dp/p}{d(1+\tau)/1+\tau} = x$

- s is the part of the tax increase borne by consumers = $\frac{dp}{dVAT}$

dVAT = $\frac{\tau+d\tau}{1+\tau+d\tau}(p+dp) - \frac{\tau}{1+\tau}p = p\frac{\tau}{1+\tau}\left[\frac{1+\tau\left(\frac{1+\tau\,dp}{p\quad d\tau}\right)}{1+\tau}\right]d\tau$

By approximation, we derive s = $\frac{1+\tau}{p}\frac{dp}{d\tau}\left[\frac{1+\tau}{1+\tau\left(\frac{1+\tau\,dp}{p\quad d\tau}\right)}\right] = x\frac{1+\tau}{1+\tau x}$

THEORETICAL FRAMEWORK (2)

$$s = \frac{1+\tau}{p}\frac{dp}{d\tau}\left[\frac{1+\tau}{1+\tau\left(\frac{1+\tau}{p}\frac{dp}{d\tau}\right)}\right] = x\,\frac{1+\tau}{1+\tau x}$$

- This equation of the consumer share s shows that s is an increasing function of x, the tax elasticity of the price. This property will be used later in the empirical part.

- We notice that when x = 0, s = 0: the consumer share is zero when the tax elasticity of the price is zero (the variation of the tax is completely absorbed by the producer who doesn't change its selling price).

- On the contrary, x = 1 => s = 1: a unity tax elasticity means that producers shift the tax entirely to the consumer.

THEORETICAL FRAMEWORK (3)

- The tax elasticity x is a proxy for consumer share.

- Theoretical analysis concludes that overshifting cannot occur in the perfect competition case, since x is equal to the ratio between supply elasticity and the sum of supply and demand elasticity. The maximum value x can take is therefore 1, which would yield a 100% consumer share.

- Under imperfect competition, and especially with fixed cost and non-constant marginal cost, an oligopolistic framework can yield a consumer share inferior or superior to the perfect competition framework depending on the degree of collusion on the market (as an increasing function).

THE IDENTIFICATION STRATEGY (1)

- To estimate the share of the commodity tax burden paid by the consumers, Carbonnier uses two specific reforms of the VAT rate in France on new car sales (1987: the rate decreases from 33.33% to 18.6%) and housing repair services (1999: from 20.6% to 5.5%).

- Advantage of this strategy: it avoids the mixing of effects that other tax changes would have on the good we study.

- These markets have very different features:

  - fixed costs are very high in the car manufacturing. The structure of the market is close to a closed oligopoly.
  - fixed costs are low in the housing repair services market, firms are very numerous, are predominantly small (almost 50% has no employee); the market structure is close to perfect competition.

- In this framework, theory predicts a higher shift of the tax to the consumers in the most competitive sector (prices are supposed to be at or near marginal cost).

THE IDENTIFICATION STRATEGY (2)

- Using data on prices (INSEE's Indice des Prix à la Consommation), Carbonnier aims at measuring the part of the tax shifting to consumers.

- The change in prices that will be observed after the VAT rate decreases have to be considered with respect to the trend that we would have expected them to follow in the absence of tax reform.

- Therefore, the price decreases will be deflated with the rate of increase they exhibited during the period before the tax reform.

ESTIMATION: CRUDE MEASURES

- The easiest way to estimate the effect is to compute the price change after the reform and to deflate it with the price change it would (could?) have experienced without the tax reform, to obtain a kind of "real" change in after-reform selling price.

- With this basic method, Carbonnier compares the selling price change with the VAT rate change.

- Tax reforms represent tax rate decreases of:

$$\frac{18.6-33.33}{1.3333} = \text{-11\% and } \frac{5.5-20.6}{1.206} = \text{-12.5\%}$$

ESTIMATION: CRUDE MEASURES

- New car sales:

  the fall in prices (adjusted for "expected inflation") has been 5.3% in the 4 months after the VAT rate decrease. Compared with a tax rate decrease of 11%, the share transmitted to the consumers amounts to 48%.

- Housing repair services:

  adjusted prices decreased by 8.8% in the 4 months after the tax reform. The tax rate decrease amounted to 12.5%, leading to a consumer share of 70%.

- These first estimates are consistent with a higher consumer share in the more competitive sector.

A MORE SOPHISTICATED ESTIMATION OF CONSUMER SHARE IN VAT RATE CHANGES (1)

- Previous estimates could have mixed the effects of the tax reform with other factors that could affect prices: production costs and general inflation.

- Carbonnier wants to estimate the consumer share s, and regresses therefore the selling price on the variation of the tax rate with 4 lags ($\sum_{i=1}^{4} \alpha_i \Delta_{t+1-i}(1+\tau)$), the overall price index change ($p_{overall}$) and the change in proxies for production costs ($p_{control}$):

$$\Delta_t(p_{dependant}) = \sum_{i=1}^{4} \alpha_i \Delta_{t+1-i}(1+\tau) + \beta \Delta_t(p_{overall}) + \sum_{i} \gamma_i \Delta_t(p_{control_i}) + \epsilon_t$$

- The sum of the α_i is the elasticity of the price to the tax rate. As we have seen previously, it is the term to use to obtain the consumer share.

A MORE SOPHISTICATED ESTIMATION OF CONSUMER SHARE IN VAT RATE CHANGES (2)

- The proxies used for the production costs are the rent price index and the energy price index.

- Taking into account the three years around the tax reform for each sector, the results are very close to those obtained with the first method.

- In the housing repair services sector, the consumer share is estimated to be 77% after 4 months compared to 52% in the car sales sector.

- The tax shift is quite rapid (more than 80% of the shift is accomplished during the first two months after the reform).

CONCLUDING REMARKS (1)

- As expected, a market structure closer to perfect competition yields a higher share of VAT paid by the consumers than an oligopoly.

- This could mean that the State could get a part of the rent captured by firms in non-competitive frameworks by increasing VAT rates in those markets.

- However, the results presented here only represent the case of VAT rate decrease.

CONCLUDING REMARKS (2)

- It has been shown (Carbonnier, 2008) that asymmetric effects are to be expected whether the tax rate goes up or down.

    => explanation: increasing production (as a potential result of higher demand due to a decline in tax rate and price) can induce higher costs than lowering output.

- Once again, these asymmetric effects are likely to depend critically on the market structure and the functional form of the costs.

- Finally, this paper focuses on the distribution of the sales tax burden on either consumers or producers. Beyond that, it can be interesting to study which income groups of consumers bear the burden for a given tax change.

SALES TAX AND PRICES: AN EMPIRICAL ANALYSIS
T. BESLEY, H. ROSEN (1998)

- The aim of the paper is the same as Carbonnier: to what extent are changes in sales tax shifted to the consumer?

- The empirical strategy is somewhat different:

- the data are at a very disaggregated level (one product rather than a whole group of products), in 155 U.S. cities, from 1982 to 1990.

- the authors estimate a reduced form equation linking the producer price p to the sales tax rate τ on this product, controlling for cost variables C and adding city and time fixed effects.

$$\ln p_{ijt} = \beta_{1i} \cdot \tau_{ijt} + \beta_{2i} \cdot C_{ijt} + CITY_{ij} + TIME_{it} + \varepsilon_{ijt}$$

for product i, city j and time t.

TAX EFFECTS IDENTIFICATION

$$\ln p_{ijt} = \beta_{1i}.\tau_{ijt} + \beta_{2i}.C_{ijt} + CITY_{ij} + TIME_{it} + \varepsilon_{ijt}$$

- The CITY fixed effect should capture the spatial characteristics that affect costs in one particular city and the TIME fixed effect should capture the macroeconomic changes that may affect costs at the same time in all cities.

- The coefficient of interest is β_{1i} : if it turns out to be significantly different from 0, then taxes have an effect on the producer price, which means that there will be:
    - Undershifting if $\beta_{1i} < 0$: an increase in taxes induces a lower producer price
    - Overshifting if $\beta_{1i} > 0$: higher sales taxes imply a higher producer price

RESULTS

- Since most tax differences on the commodities included in the sample exhibit a much higher variation at the cross-sectional level than in the time dimension, the effects identified are likely to be mainly driven by cross-sectional variation (as opposed to Carbonnier's focus on the change of VAT rate on one good in a time series).

- While the β_{1i} is close to zero or insignificant on one third of the 12 commodities, the other commodities display a shifting parameter higher than 0, which means that overshifting of the tax occurs.

- These results are robust to alternative specifications: introduction of lag effect of taxes on prices, modification in the cost variables…

IMPLICATIONS AND CRITICISMS

- Evidence of overshifting of sales tax on certain goods could lead policy makers to reduce taxation on them: taxes induce a price increase more than proportional to the tax increase and therefore reduce the consumer surplus.

- The long time period and the large sample of cities may be an obstacle to a correct estimation of the shifting parameter since other effects could lead to a bias in the coefficients (the inclusion of interaction with other taxes alters the estimation and authors have to exclude common appearance of taxes on clothing and the general tax rate to prevent collinearity).

- On the contrary, Carbonnier uses only one VAT rate change that is not concomitant with other tax modifications and may allow to identify more precisely the effects.