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JEL Codes : D40, H22, H31, H32

Keywords : Commodity taxation, tax incidence, economic agents behaviour, oligopoly.

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# Is Tax Shifting Asymmetric ?

## Evidence from French VAT reforms, 1995-2000

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## Abstract

This paper presents evidence from three French VAT reforms showing that tax shifting on prices operates differently upwards and downwards. This paper puts forward two different asymmetric effects. The first one is linked to asymmetries in firms' supply curves, which implies that price decreases are smaller than price increases. The second asymmetric effect is linked to asymmetries in customers' demand curves, which react more to big price changes than to tenuous ones. This implies that price decreases are bigger than price increases. This paper shows that this second effect can counteract the first effect in markets with high fixed costs.

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**Key Words** : Commodity Taxation ; Tax Incidence ; Economic Agents Behaviour ; Oligopoly.
**JEL classification** : D40, H22, H31, H32.

# 1 Introduction

This paper studies the economic impact of commodity tax reforms, and attempts to compare tax shifting on prices upwards and downwards. Commodity taxation is heavily used all around the world, through different kinds of taxes, as VAT in Europe or local commodity taxes in the United States. Commodity tax rates in the United States are often fluctuating and, for more than a decade, the European Union has attempted to make VAT rates converge throughout their members. These frequent changes of commodity taxation legislation offer the opportunity to study the incidence of this kind of taxes through natural experiments.

The novelty of this paper is to present evidence from three French VAT reforms showing that tax shifting on prices operates differently upwards and downwards, and to suggest theoretical mechanisms that can explain these facts.

A number of papers have already studied commodity tax incidence on prices, but they usually consider tax shifting on prices as a symmetric event. The basic definition is that taxes are fully-shifted on prices if before tax prices do not vary after fluctuations of the commodity tax rate (the tax shifting parameter is then said to be equal to 100%). Following the same pattern, taxes are over-shifted on prices if before tax prices increase (the tax shifting parameter is then bigger than 100%) and they are under-shifted on prices if before tax prices decrease (the tax shifting parameter is then smaller than 100%). Under perfect competition hypothesis, taxes can not be over-shifted, and the tax shifting parameter is always less or equal to 100%. Whether it is close to 100% or to 0% depends on the relative elasticity of the demand and supply curves.

Tax shifting under different imperfect competition hypothesis has also been studied. Katz & Rosen (1985) consider closed Cournot oligopoly. Stern (1987) and Besley (1989) examine free entrance oligopoly, based on conjectural variation model developped by Seade (1980). Cremer & Thisse (1994) study a differentiated oligopoly. One of the main result of all these studies is that in imperfect competition markets, taxes may be over-shifted. However, these papers also show that the impact of imperfect competition depends on specific parameters of the markets and can go either way. Furthermore, this litterature does not consider differences between commodity tax rate increases and decreases.

For instance, Besley & Rosen (1999) empirically test tax shifting in the United States through cross city and panel regressions. This paper firstly finds that tax shifting on prices is very fast. Moreover, it finds that some taxes on goods sold through the retail industry are over-shifted. This confirms the theoretical results on oligopoly markets. Indeed, the retail industry is commonly considered as an oligopoly. However, this study is based on many variations of the different local commodity tax rates, both upwards and downwards, and therefore measures a mean effect of upwards and downwards tax shifting.

The present paper develops the hypothesis that tax shifting operates differently upwards and downwards. There are two asymmetric effects. The causes are the asymmetric properties of firms supply curves on the one hand, and of consumers demand curves on the other hand.

First of all, the asymmetric properties of supply curves can be due to asymmetries in the production process of firms. Indeed, it is easier for firms to decrease their production than to increase it, at least in the short and medium run. Increasing output often requires hiring new workers and undertaking new investments, wich can induce long delays. This implies smaller price decreases than price increases. That is, following a decrease of the VAT rate, an increase of the supply is needed to observe a decrease of prices. Therefore, the existence of constraints on supply increases leads to small price decreases. This can explain why studying French VAT reforms on perfect competition markets we find tax shifting parameters close to 100% following VAT increases (an average of 91%) and tax shifting well below 100% following VAT decreases (an average of 22%)[1].

The first effect is general and should apply to all industries, but it may be compensated by a second asymmetric effect in case of collusion. The second asymmetric effect is linked to the shape of the customers' demand curves, which may react with higher intensity to big price changes than to tenuous ones. This might be due to psychological effects or to the shadow price of changing one's consumption habits. Therefore, in markets with monopolistical firms or with collusion - markets that better consider the variations of the demand because of the price making power of firms - price increases are relatively weak in order to prevent the fall of the demand, and price decreases are relatively strong in order to take profit of the takeoff of the demand. This can explain why studying French VAT reforms on oligopoly markets we find tax shifting parameters well below 100% following VAT increases (an average of 52%) and over-shifting of the tax following VAT decreases (an average of 130%).

These asymmetric effects take a great importance in the political debate because they put forward the existence of a bias toward high VAT rate. If politicians have a short term bias and make their reforms with the aim of obtaining viewable short run results, the decision of decreasing the VAT rate will rarely be taken. Indeed, amongs the goods subject to the full-rate - which do not take the main part of custommers' budgets - only the capital intensive goods would reflect commodity tax decreases in the short run. Such bias may occur specially when governments choose a temporarily increase of commodity taxes in order to face transitory budget problems. The temporary reforms might be changed in permanent ones. This is what happens in France for the reforms studied in this paper.

The rest of the paper is organised as follows.

[1] These tax shifting parameters are calculated over a 4-month window.It'is very difficult - if not impossible - to properly identify tax shifting on prices beyond a 4 to 6 month window.

In section 2, I present the tax reforms and data sources that are used for this empirical study. The effects explained above are tested with price data using three French fiscal reforms. These reforms occured on August $10^{th}$ 1995, on September $1^{st}$ 1999 and on April $1^{st}$ 2000. The choices in terms of data sets are explained by the aim of comparing labour-intensive services and capital-intensive products, the second kind of goods representing the oligopoly markets.

In section 3, I present the regressions that allow to estimate tax shifting parametersup-wards and downwards. I use therefore difference in difference regressions on the prices of the selected goods around both the August $10^{th}$ 1995 and the April $1^{st}$ 2000 VAT full-rate reforms. Two asymmetric effects appear. The first one appears concerning labor intensive services, with tax shifting upwards superior to tax shifting downwards. The second one appears concerning capital intensive products, with tax shifting upwards inferior to tax shifting downwards.

In section 4, I attempt to explain the asymmetric effect occuring for labor intensive services, which I called "supply effect". Therefore, I propose theoretical arguments for an asymmetry in firms' supply curves, which explain why it is more difficult to increase the output than to decrease it, which may lead to lower price variations downwards than upwards.

In section 5, I attempt to explain the asymmetric effect occuring for capital intensive products, which I called "demand effect". First of all, I confirm this asymmetric effect runing comparison regressions. Then I propose theoreticalarguments for asymmetries and non linearities in customers' demand curves, which supposes that demand reacts more strongly to considerable price variations than to tenuous ones. Hence, when some collusion exists on markets, and particularly in the monopoly cases, production plans take into account these customers' demand curves properties, which may lead to higher price variations downwards than upwards.

In section 6, I try to confront the hypothesis on the causes of the "supply effect" to bigger VAT rate changes. In that point, I studied the 1999 European experience on VAT on several services. I focus on repair services in more than two year old habitation, whose VAT rate went down from 20,6% to 5,5 % on Septembre $1^{st}$ 1999.

In section 7, I present the conclusions. There is also discussed the consequences of these results in terms of political decisions, and I try to understand the share out of the VAT costs for firms between labor and capital.

## 2 Tax reforms and data sources

The point of this study is to examine empirically tax shifting on prices after VAT rate changes. In particular, the objective is to compare tax shifting upwards and downwards, in order to understand the asymmetrical properties of tax shifting. Therefore, I analyse the consequences

of three different reforms that occured in France recently. In France, there exists severals VAT rates. The main ones are the full rate - which applies to most consumption goods except food and cultural goods - and the reduced rate - which applies to the food and cultural goods. Moreover, there exist special rates, such as zero rate - for financial services, housing rents and real estate - and a super reduced rate - for newspapers. The reduced rate is 5.5%, the super reduced rate is 2.1%. Two reforms out of the three I study changed the VAT full-rate. This rate was increased from 18,6% to 20,6% on August $10^{th}$ 1995, then it was decreased from 20,6 % to 19,6% on April $1^{st}$ 2000, and has not been changed since then. The other reform occured on September $1^{st}$ 1999, and was part of the European experiment on low-qualified labor-intensive services. European Union allowed states to apply their VAT reduced rate to several labor intensive services. For that reason, in France, the VAT rate of repair services in more than two year old housing went down from 20.6% to 5.5% in September $1^{st}$ 1999.

The main data source used for this study are price series built by INSEE. I can use monthly series concerning 296 different kinds of goods. Each represents the global prices of a set of consumption goods. From these 296 index series, I have selected those which are meaningful from the point of view of this paper. The first condition for an index to be selected is that the VAT rate for each good in the index is the same and that this rate is the full-rate, except for the control index and the home repair services index. Regarding the control index, I choose a set of goods that has not been affected by any of the VAT reforms, actually I choose books. Indeed book VAT rate has been the reduced rate since 1989, and therefore has always been 5.5% since this time. I also run the regressions using drugs as control goods, which gives globally the same results. Food goods might be used because they are taxed at the reduced rate, but their prices are too much affected by the whether and the seasons.

The second condition is for the set to be quite homogenous with respect to the competition structure. This study tries to compare tax shifting that occured in markets whose properties are close to perfect competition or to oligopoly with some collusion. The point is to understand the competition effects on tax shifting. In that purpose, I study price series for manufactured products on the one hand, and for labor intensive services on the other hand. The main idea is to compare labor intensive and capital intensive goods. Indeed, the manufactured productions, which need fixed capital, have high fixed costs and few competitors, and therefore may be better represented by an oligopoly model. I assume that labor, and particularly low qualification labor is more flexible, and therefore labor intensive services may be represented by a perfect competition model.

Indeed, a production sector is called capital intensive if high investments are needed before producing. These investments, which may be considered as fixed costs, generate increasing returns to scales, and then constitute a kind of entry barrier. Then, even with free entrance and competition, the existence of high investments required, coupled with potential strategic

acting of insiders, makes the competition imperfect and leads to oligopoly (e.g. Dixit (1980 & 1986), Baumol Panzar & Willig (1982), Spence (1983)).

In order to measure this competition effect, I compare tax shifting on the prices of services to private individuals on the one hand, and on the prices of manufactured products. As one can see on table 1, these categories of good reflect the capital or labor intensity of the production. In 1995 as in 2000, manufactured products - which are represented in this table and in the rest of the study by the consumption goods industry - were far more capital intensive than services - which are represented by personal and domestic services. These properties are very different between the two kinds of goods. In order to compensate the depreciation of the fixed capital, consumption good producers should invest regularly a lot more than personal and domestic services providers. Thus, comparing price reactions of industrial products and services may allow to understand differences between pricing on oligopoly and perfect competition markets.

| | **Fixed Capital / Value Added** | |
|---|---|---|
| | 1995 | 2000 |
| **Capital intensive products** (Consumption good industry) | 161 % | 180 % |
| **Labor intensive services** (Personal and domestic services) | 33 % | 41 % |

**Table 1 : Fixed costs for labor and capital intensive goods**

Fixed Capital : Capital issued of production process that is used continuously for other production process during at least one year
Data from the French Annual National Accounts published by INSEE

As examples of manufactured products, I study domestic machines, home repair products, earthenware and crockery. As examples of labor intensive services, I study hairdressing, domestic machine repairs and technical repairs[2]. In addition, I study the prices of restaurants and cafés, wich constitute intermediate sectors. Finally, I study the price series of the repair services in more than two year old housing, which is a low skill labor intensive service.

# 3 Estimating Tax Shifting Parameters

The first part of the study consists in estimating tax shifting parameters for the prices of the selected goods, after both the 1995 and 2000 French VAT rate reforms. The two reforms changed the VAT full-rate. Made shortly one after the other, they have been made in opposite directions. First of all, the VAT full rate has been increased on August $10^{th}$ 1995, from 18,6% to 20,6%. Five years later, on April $1^{st}$ 2000, the full rate has gone back from 20,6% to 19,6%. Comparing tax shifting after these two reforms will help to understand the asymmetric shifting properties of taxes.

Before presenting the tax shifting regressions and their results, intuitive effects of these fiscal reforms can be seen on figure 1 and figure 2. These figures plot price series technical

[2]This last index gives the prices of Hi-Fi and computer repairs.

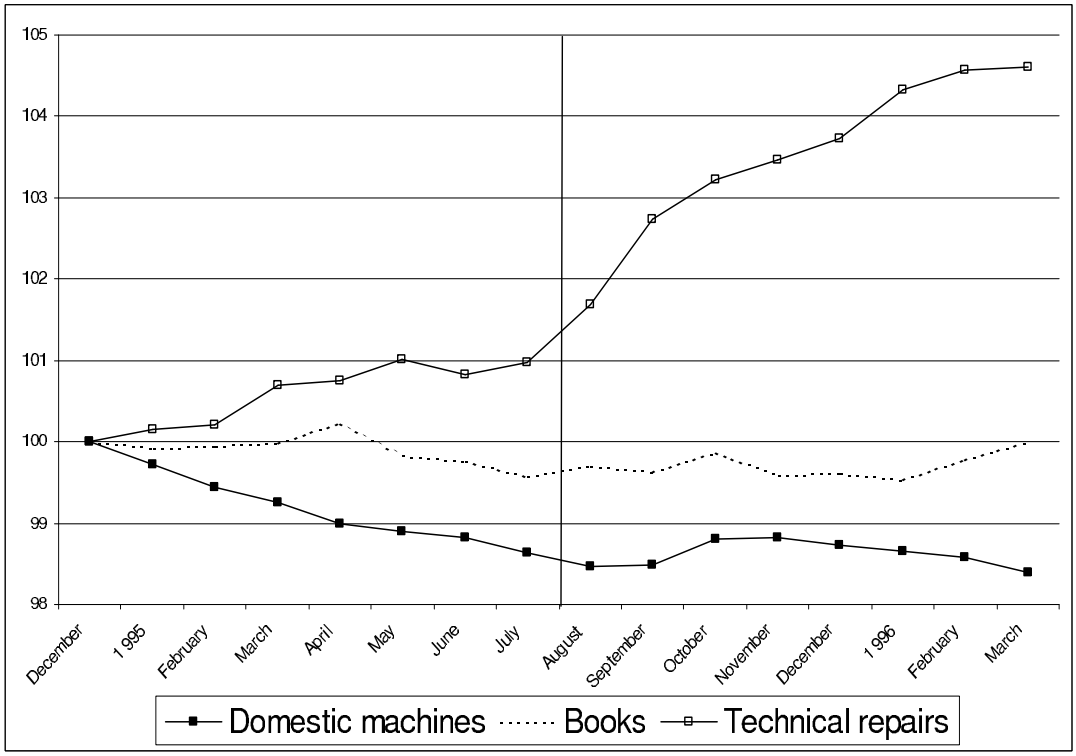


Figure 1: Prices around the 1995 French VAT reform

The prices are corrected from an inflation trend estimated as the mean of the book inflation during the 16 month considered.

repairs - that are part of the personal and domestic services - and domestic machines - that are products from the consumption good industry.

The prices of the two goods have a fast price increase shortly after August $10^{th}$ 1995 on figure 1. This may answer a first question that is : do prices reflect small VAT changes ? The inflexions of the price series suggest a positive answer. A decrease shortly after September $1^{st}$ appears also on figure 2, but it is less clear. Morover, it seems that technical repairs price variation is bigger than domestic machines price variation on figure 1, and that it is smaller on figure 2.

The point of this paper is to compare upwards and downwards tax shifting on prices. From that point of view, comparing figure 1 and figure 2 leads to the conclusion that the 1995 shifts on prices had been higher than those of 2000. However, this impression might be an illusion linked to the fact that the 2000 VAT full rate decrease was only of 1%, although the 1995 VAT full rate increase was of 2%. Hence, the point of this section is to determine through regressions whether these visual differences between price shifting upwards and downwards are valid.

At last, another property appears clearly out of the comparison of figures 1 and figure 2 : although the tax shifting upwards has been very fast in 1995, it seems to have been slower downwards in 2000.

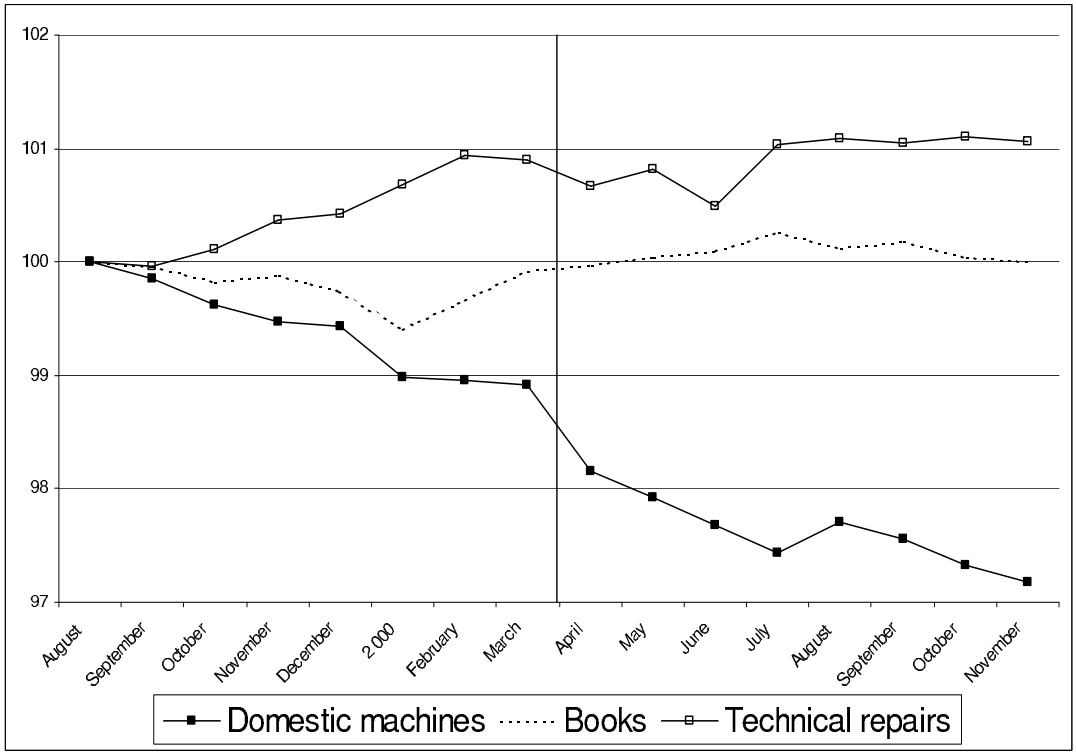


Figure 2: Prices around the 2000 French VAT reform

The prices are corrected from an inflation trend estimated as the mean of the book inflation during the 16 month considered.

In order to estimate precisely tax shifting parameters, I implement regressions of the relative price variations on the relative tax variations. More precisely, tax shifting parameter is given by the following equation, where $\tau$ is the tax rate, $p$ the after tax price and $t$ the time.

$$x = \frac{1+\tau_t}{p_t}\frac{p_{t+1}-p_t}{\tau_{t+1}-\tau_t} \tag{1}$$

This parameter is the ratio between the effective after-tax prices following the reform and the after-tax prices if the pre-tax prices do not change following the reform. Thus, the tax is fully shifted - then $x = 100\%$ - if the pre-tax prices do not change following the reform (i.e. : $\frac{p_{t+1}}{1+\tau_{t+1}} = \frac{p_t}{\tau_t}$), and $x = 0\%$ if the after-tax prices do not change following the reform (i.e. : $p_{t+1} = p_t$).

Two different operators are used for these regressions. First of all, the operator of price increase : $\Delta_{p,t} = \frac{p_{t+1}-p_t}{p_t}$, and secondly the operator of VAT rate increase : $\Delta_{\tau,t} = \frac{\tau_{t+1}-\tau_t}{1+\tau_t}$. In this section, the regressions are ran with monthly data.

A classical issue consists in trying not to be deluded by natural economic variations. In order to avoid this problem, two different strategies are used in parallel. First of all, the regressions are difference in difference ones with respect to the prices of goods which had not been affected by the fiscal reform : in practice, the present results use book prices. Secondly, these regressions are controlled with variables providing information about the production

costs : in practice, energy prices and rents are used. The regressions follows equation 2 :

$$\Delta_{p,t} = \alpha + \sum_{i=0}^{3} \beta_i \Delta_{\tau,t-i} + \gamma \Delta_{p_{books},t} + \delta \Delta_{p_{costs},t} + \epsilon_t \tag{2}$$

The tax shifting parameter is defined as $x = \sum_{i=0}^{3} \beta_i$. Indeed, the regressions are made with a monthly time scale, adding delays on the regressors of the VAT rate increase. The point of doing so is to understand tax shifting dynamics. This is then a tax shifting parameter estimated over a four months window. I also runs regressions with more delays on the VAT rate, the additionnal estimations were always close to 0 and not significant. This suggest that it is very difficulted - if not impossible - to identify tax shifting on prices beyond a 4-to-6 month window.

In addition to the main control variables, the regressions of cafés consumptions and restaurants are also controlled with before tax prices of alcoholic drinks[3]. Indeed, these intermediate products take an important part in the formation of the prices of the cafés consumptions. In addition, these drinks are submitted to the VAT full-rate. Hence, if the tax shifting parameter for alcoholic drink prices is inferior to 100%, before tax prices of alcoholic drinks decreases when the VAT tax rate increases. Therefore, not taking this fact in account might lead to under-estimate the tax shifting parameter of cafés consumptions.

I run two series of regressions with the data described in section 2, one concerning each reform. The results for the 1995 reform are presented in table 2 and the results for the 2000 reform are presented in table 3.

The first important property which has to be noticed deals with the $R^2$ of these regressions. They are quite often high, and particularly for the 1995 reform. This means that, during all of the three years that are considered for these regressions, the few controls used and the VAT tax rate variation are enough to explain the main part of price variations.

It is also important to notice the usefulness of the additional controls introduced in the price regressions of the consumptions at cafés and restaurants. As explained in the presentation of these additional controls, commodity taxes on alcoholic drink prices are far lower than full-shifted - actually, tax shifting parameter for the alcoholic drink prices is found equal to 68% - and therefore the tax shifting parameter without controlling by the alcoholic drink prices is under-estimated. Indeed, the tax shifting parameter for the restauration prices increases from 54% to 65% - and $R^2$ also increases, from 79% to 81% - when controling and the tax shifting parameter for prices of consumptions at cafés increases from 51% to 72% - and $R^2$ also increases, from 56% to 59% - when controlling. One can note that the under-estimation is bigger for the consumptions at cafés than for those at restaurants, which is obviously implied by the far bigger part of alcoholic drinks in their intermediate consumptions.

[3]Indeed, the before tax prices is the one that has to be used in these regressions because VAT had been built with the point to tax value-added only once. Hence, firms can deduce the VAT they paid on their intermediate consumption purchases from the VAT they have to pay on their sales. This means that firms do not pay VAT on their intermediate consumptions.

| | | Obs | $R^2$ | VAT ($\beta_0$) | VAT(t-1) ($\beta_1$) | VAT(t-2) ($\beta_2$) | VAT(t-3) ($\beta_3$) | Tax Shifting Parameter (x) |
|---|---|---|---|---|---|---|---|---|
| *Capital intensive* | *Domestic Machines* | 36 | 0.59 | - 0.013 (0.075) | 0.137 (0.060) | 0.308 (0.061) | 0.144 (0.061) | **58 %** (13 %) |
| | *Home Repair Products* | 36 | 0.44 | 0.265 (0.143) | 0.365 (0.114) | - 0.168 (0.116) | 0.032 (0.116) | **49 %** (25 %) |
| | *Earthenware* | 36 | 0.29 | 0.111 (0.151) | 0.205 (0.120) | 0.070 (0.123) | 0.077 (0.122) | **46 %** (26 %) |
| | *Crockery* | 36 | 0.39 | 0.205 (0.125) | 0.129 (0.099) | 0.179 (0.101) | 0.057 (0.101) | **57 %** (21 %) |
| | *Average* | | | | | | | **52 %** (11 %) |
| *Labor intensive* | *Restauration* | 36 | 0.79 | 0.322 (0.045) | 0.177 (0.035) | 0.067 (0.036) | - 0.021 (0.036) | **54 %** ( 8 %) |
| | *Restauration (controled)* | 36 | 0.81 | 0.262 (0.055) | 0.361 (0.111) | 0.045 (0.037) | - 0.018 (0.035) | **65 %** (13 %) |
| | *Cafés* | 36 | 0.56 | 0.349 (0.110) | 0.280 (0.087) | - 0.046 (0.089) | - 0.070 (0.088) | **51 %** (19%) |
| | *Cafés (contrôlée)* | 36 | 0.59 | 0.231 (0.138) | 0.643 (0.277) | - 0.089 (0.093) | - 0.065 (0.087) | **72 %** (33 %) |
| | *Hairdressing* | 36 | 0.71 | 0.466 (0.102) | 0.272 (0.081) | 0.052 (0.083) | 0.015 (0.082) | **81 %** (17 %) |
| | *Domestic Machines Repairs* | 36 | 0.36 | 0.096 (0.238) | 0.237 (0.190) | 0.612 (0.193) | 0.125 (0.192) | **107 %** (41 %) |
| | *Technical Repairs* | 36 | 0.45 | 0.383 (0.195) | 0.563 (0.156) | 0.259 (0.159) | 0.107 (0.158) | **131 %** (34 %) |
| | *Average* | | | | | | | **91 %** (13 %) |

**Table 2 : Tax shifting parameter at the time of the July 1995 French VAT Reform (VAT rate increase)**

| | | Obs | $R^2$ | VAT ($\beta_0$) | VAT(t-1) ($\beta_1$) | VAT(t-2) ($\beta_2$) | VAT(t-3) ($\beta_3$) | Tax Shifting Parameter (x) |
|---|---|---|---|---|---|---|---|---|
| Capital intensive | *Domestic Machines* | 36 | 0.21 | 0.823 (0.360) | 0.183 (0.357) | 0.204 (0.354) | 0.180 (0.356) | **139 %** (71 %) |
| | *Home Repair Products* | 36 | 0.23 | 0.337 (0.425) | 0.203 (0.422) | - 0.012 (0.418) | 0.944 (0.421) | **147 %** (84 %) |
| | *Earthenware* | 36 | 0.07 | 0.304 (0.515) | 0.421 (0.512) | 0.260 (0.507) | 0.276 (0.510) | **126 %** (102 %) |
| | *Crockery* | 36 | 0.11 | 0.207 (0.326) | 0.250 (0.324) | 0.357 (0.321) | 0.255 (0.323) | **107 %** (65 %) |
| | *Average* | | | | | | | **130 %** (41 %) |
| Labor intensive | *Restauration* | 36 | 0.10 | 0.115 (0.135) | 0.090 (0.134) | 0.100 (0.132) | - 0.136 (0.133) | **17 %** (27 %) |
| | *Restauration (controled)* | 36 | 0.16 | 0.057 (0.141) | 0.297 (0.208) | 0.109 (0.131) | - 0.148 (0.132) | **32 %** (31 %) |
| | *Cafés* | 36 | 0.12 | 0.180 (0.174) | - 0.214 (0.173) | 0.038 (0.171) | 0.042 (0.173) | **4 %** (35 %) |
| | *Cafés (contrôlée)* | 36 | 0.16 | 0.117 (0.184) | 0.009 (0.272) | 0.047 (0.171) | 0.029 (0.173) | **20 %** (41 %) |
| | *Hairdressing* | 36 | 0.25 | - 0.043 (0.184) | 0.062 (0.183) | 0.120 (0.181) | 0.223 (0.182) | **36 %** (37 %) |
| | *Domestic Machines Repairs* | 36 | 0.19 | - 0.026 (0.316) | 0.131 (0.315) | 0.148 (0.311) | - 0.342 (0.313) | **- 9 %** (63 %) |
| | *Technical Repairs* | 36 | 0.42 | 0.420 (0.200) | - 0.079 (0.198) | 0.517 (0.196) | - 0.530 (0.198) | **33 %** (40 %) |
| | *Average* | | | | | | | **22 %** (19 %) |

**Table 3 : Tax shifting parameter at the time of the April 2000 French VAT reform (VAT rate decrease)**

The two important results that come out of these regressions consist in the two different asymmetric effects occuring for the two kinds of goods studied. For each labor intensive service, the tax shifting parameter is higher upwards than downwards. Indeed, table 2 and table 3 show that tax shifting averages for these goods are 91% upwards and 22% downwards. This is the "supply asymmetric effect". We propose an explaination of this effect in section 4. For each capital intensive product, the tax shifting parameter is lower upwards than downwards. Indeed, table 2 and table 3 show that tax shifting averages for these goods are 52% upwards and 130% downwards. This the "demand effect". We propose an explaination of this effect in section 5.

In order to compare with Besley & Rosen (1999) empirical results, it should be noticed that they regress the before tax price logarithm variation on the tax rate variation. Hence, the relation between their tax shifting indicator $\beta_{BR}$ and our tax shifting parameter $x$ is : $x = 1 + (1+\tau)\beta_{BR}$. They find indicators $\beta_{BR}$ between $-0.282$ and 1.42, with only the higher ones - that are for goods sold by the retail industry - significantly different from 0, which is the full shifting. It corresponds to tax shifting parameter $x$ between 70% and 250%. It means that they find tax shifting a bit higher than in the present study. However, their regressions are partly cross-section, and the local commodity tax rate on a good consumption may be linked to different properties of the local demand elasticity for this good. A low demand elasticity with respect to the prices of a kind of goods may induce together high prices and high commodity tax rates - according to the Laffer curve. This mechanism may lead to over estimation.

Nevertheless, their results are consistent with ours. They also find that price shifting occurs very quickly. According to their results, only between 0.29 and 1.27 quarters are necessary for the taxes to shift totally on prices. This is consistent with our four month window.

The main difference between their paper and our paper lies in the analysis of the asymmetric properties. They do not regress separately tax rate increases and tax rate decreases. Consequently, because prices do not react the same way upwards and downwards, their results depend on the number of commodity tax rate increases and decreases in their time series.

# 4 Explaining the supply asymmetric effect

In this section, I concentrate on taxe shifting on labor intensive markets. Two main differences between the 1995 and 2000 tax shifting on labor intensive service prices appear in table 2 and table 3. On one hand, there is a difference between the shifting dynamics, and on the other hand, there is a great difference in the values of the tax shifting themselves. Table 4 recalls the values of tax shifting for the labor intensive services.

| | *1995 shifting* | *2000 shifting* |
|---|---|---|
| ***Restauration*** | 65% | 32% |
| ***Cafés*** | 72% | 20% |
| ***Hairdressing*** | 81% | 36% |
| ***Domestic Machines Repairs*** | 107% | -9% |
| ***Technical Repairs*** | 131% | 33% |
| ***Average*** | **91 %** (13 %) | **22 %** (19 %) |

**Table 4 : Differences between 1995 and 2000 tax shifting on prices of labor intensive services**

One can see on table 4 that tax shifting upwards is significantly more important than tax shifting downwards. The 95% confidence intervals of the averages upwards and downwards do not cross each other. An explaination may be that it is much more difficult to increase production than to decrease it. And no producer would find any interest in changing its prices if the competition provides neither more nor less goods. Hence, production increase after a VAT rate decrease - and therefore a decrease of the marginal cost of production - should take more time to occur - if even it occurs fully - than production decrease after a VAT rate increase. As a consequence, the tax shifting on labor intensive service prices is lower downwards than upwards.

Indeed, let us consider a simple perfect competition model. Consider a unique good economy where everybody, producer and customer, is price-taker. Let $p$ be the after-tax price, $\tau$ be the tax rate, $Q^s(p)$ be the producer's supply curve, $Q^d(p)$ be the customer's demand curve and $C(Q)$ be the producer's cost function. At the equilibrium :

$$\frac{p}{1+\tau} = \frac{\partial C}{\partial Q}\left(Q^d(p)\right) \tag{3}$$

Differentiating equation 3 in an equilibrium path gives :

$$x = \frac{1+\tau}{p}\frac{dp}{d\tau} = \frac{1}{1-(1+\tau)\frac{\partial^2 C}{\partial Q^2}\frac{\partial Q^d}{\partial p}} \tag{4}$$

Studying small VAT rate variations, $\frac{1+\tau}{p}\frac{dp}{d\tau}$ is a first-order approximation to the tax shifting parameter. The definition of the customer's demand elasticity is $\epsilon_d = -\frac{p}{Q}\frac{\partial Q^d}{\partial p}$. Under perfect competition hypothesis with decreasing return to scale, the producer's supply elasticity is $\epsilon_s = \frac{p}{Q}\frac{\partial Q^s}{\partial p} = \frac{p}{Q}\frac{1}{(1+\tau)\frac{\partial^2 C}{\partial Q^2}}$. Then equation 4 may be rewritten as follows :

$$x = \frac{\epsilon_s}{\epsilon_s + \epsilon_d} \tag{5}$$

The main intuitive effects are easily viewable in equation 5. First of all the tax shifting parameter is always inferior to 100%, because $\epsilon_s$ and $\epsilon_d$ are positive. Secondly, it decreases with the customer's demand elasticity. Thirdly, it increases with the producer's supply elasticity. In order to summarize both the previous effects, one can say that customers' reactivity to prices makes tax shifting decrease as the producers' reactivity makes it raise.

Concerning the asymmetric effect on tax shifting, the argument I suggest consists in looking back at equation 4 and saying that $\frac{\partial^2 C}{\partial Q^2}$ is not symmetric, and actually that it

is bigger when $\Delta Q < 0$ than when $\Delta Q > 0$. There are mainly two possible causes for this property. First of all one can consider that $\frac{\partial^2 C}{\partial Q^2}$ is composed of two parts, because of the existence of a transitory state and a stationary state. The first part is the stationary variation of the marginal cost of production because of the variations of the output and the non constant returns of scales. This part is symmetric - the value of the first part when $dQ > 0$ ($\Delta_1 > 0$) is the opposite of the one when $dQ < 0$ ($-\Delta_1 < 0$). The second part is the transitory variation of the marginal cost due to restructuration needs, which is always positive ($\Delta_2 > 0$). Hence, the absolute value of the marginal cost variation ($\left|\frac{\partial^2 C}{\partial Q^2}\right|$) is bigger when $dQ > 0$ than when $dQ < 0$ ($|\Delta_1 + \Delta_2| > |\Delta_1 - \Delta_2|$). Because there are less output sales when the prices are higher, marginal cost's variations are smaller when prices increase than when they decrease, and therefore taxes shift more fully on prices when the VAT rate increases than when it decreases.

Another propertiy reinforces this effect ; increasing the output needs to be financed although decreasing it does not. Thus, because of credit constraints, it is more difficult to restructurate a firm to produce more than to produce less, more especially as it concerns small firms.

The arguments are complementary, the idea is basically the same. Because it is more difficult to increase than to decrease one's production, supply elasticity is bigger upwards than downwards, which is the cause of a general asymmetric effect that makes the taxes shift more fully upwards than downwards.

According to this arguments, differences in shifting dynamics between upwards and downwards shifting should be observed. This property seems to appear on table 2 and table 3. Indeed, whereas the coefficients of the first two delays in the 1995 regressions are high and significative, the coefficients of the last two delays of these same regressions are low. In 2000, prices react in the opposite way and the 2000 tax shifting on prices is slower. Indeed, first month shifting parameters are globally small, as the last month shifting parameters are still considerable.

| | $\beta_0 + \beta_1 - \beta_2 - \beta_3$ in 1995 | $\beta_0 + \beta_1 - \beta_2 - \beta_3$ in 2000 |
|---|---|---|
| **Restauration** | 0.596*** | 0.393 |
| | (0.134) | (0.313) |
| **Cafés** | 1.028*** | 0.050 |
| | (0.335) | (0.409) |
| **Hairdressing** | 0.671*** | -0.324 |
| | (0.174) | (0.365) |
| **Domestic Machines Repairs** | -0.404 | 0.299 |
| | (0.408) | (0.628) |
| **Technical Repairs** | 0.580* | 0.354 |
| | (0.335) | (0.396) |

**Table 5 : Dynamic differences between 1995 and 2000 tax shifting**

*** : 1% significative
** : 5% significative
* : 10 % significative

In order to test more precisely this hypothesis, I compare tax shifting during the first

two months after the reform with tax shifting during the two following months. That is, I estimate $\beta_0 + \beta_1 - (\beta_2 + \beta_3)$, which gives the difference between shifting during the first two months and during the two following months. In order to understand the significance level of these differences, I also calculate the standart errors of these values. The results are reported in Table 5.

One can see on table 5 that the values of $\beta_0 + \beta_1 - (\beta_2 + \beta_3)$ are positive in 1995 at a high significant level. On the oppposite, the values of these indices are smaller and non significant in 2000. This means that tax shifting is really faster upwards in 1995 than downwards in 2000. This confirms the hypothesis of faster shifting upwards than downwards.

# 5 Explaining the demand asymmetric effet

An other asymmetric effect appears in section 3, concerning the capital intensive products. For these goods, the change between 1995 and 2000 tax shifting parameters occurs in the opposite direction. Table 6 recalls the values of tax shifting for the capital intensive goods. There, capital intensive product prices behaves clearly in a different way from the labor intensive service prices, studied in the previous section. The tax shifting parameters for these manufactured product prices are higher downwards in 2000 than upwards in 1995.

| | *1995 shifting* | *2000 shifting* |
|---|---|---|
| ***Domestic Machines*** | 58 % | 139 % |
| ***Home Repair Products*** | 49 % | 147 % |
| ***Earthenware*** | 46 % | 126 % |
| ***Crockery*** | 57 % | 107 % |
| ***Average*** | **52 %** (11 %) | **130 %** (41 %) |

**Table 6 : Differences between 1995 and 2000 tax shifting on prices of capital intensive products**

Indeed, the tax shifting parameters for the capital intensive product prices are inferior to 60% at the time of the 1995 reform, whereas the tax shifting parameters for the labor intensive service prices is more important : 81% for hairdressing, 107% for domestic machine repairs and 131% for technical repairs. In 2000, there is a complete U-turn of the order of the tax shifting between manufactured products and services. Tax shifting is much more important on manufactured product prices than on service prices. Obviously, while the 2000 tax shifting parameters for the labor intensive service prices are inferior to 36%, the tax shifting parameters for capital intensive product prices are superior to 100%.

Though, looking at table 6, one can see that as it appears when looking at figure 2 - showing the prices around 2000 - the standard errors are quite all very high. Indeed, the 95% confident intervals of the tax shifting averages upwards and downwards cross (the 85% confident intervals do not cross). Thus, before proposing an explanation of this demand asymmetric effect, it is important to confirm the significance level of this asymmetry property.

To do so, I run other regressions, as defined by equation 6. This equation allows to compare the tax shifting parameters for the prices of two goods $A$ and $B$, at the same period.

$$\Delta_{p_A,t} - \Delta_{p_B,t} = \alpha + \beta\Delta_{\tau,t} + \gamma\Delta_{p_{books},t} + \delta\Delta_{p_{costs},t} + \epsilon_t \tag{6}$$

It is the same kind of regression equation as equation 2. The first difference is that there is no delay on coefficient $\Delta_{\tau,t}$, because the time scale of the data used for these regressions is three point a year. Hence, the four month time of the complete tax shifting lies between the period where the reform occurs and the following period. This time scale is used in this section because the tax shifting dynamics are not studied here.

There exists another main difference between equation 2 and equation 6. In this section, instead of regressing price increases on VAT rate increases, I regress differences between two price increases on VAT rate increases. Therefore, the significativity of coefficient $\beta$ would imply that VAT rate's variation impacts significantly differently on the two kinds of goods. Moreover, $\beta > 0$ ($\beta < 0$) implies that tax shifting parameter for the prices of goods $A$ ($B$) is higher than the one on the prices of goods $B$ ($A$).

These regressions are ran for several couples of goods - each time comparing one set of manufactured products and one set of labor intensive services - independently for both VAT full-rate reform. The results of the regressions around 1995 period are presented in table 7, and the ones around the 2000 reform are presented in table 8.

After the 1995 French fiscal reform, the tax shifting parameters for the prices of labor intensive services are greater than the ones on the prices of capital intensive products. The significativity of these results is 20% for all the pairs of goods but hairdressing and domestic machine repairs versus crockery. Moreover, seven differences between tax shifting are 10% significant and five are 5% significant : domestic machines repairs versus domestic machine and technical repairs versus the four manufactured products that are studied.

After the 2000 French fiscal reform, differences between tax shifting are less significant, but the tax shifting parameters for the prices of capital intensive products are greater than the ones on the prices of labor intensive services. Seven regressions have 20% significant coefficients, three have 10% significant coefficients and two have 5% significant coefficients. The 5% significant two are home repair products versus hairdressing and domestic machine repairs.

These results confirm that the tax shifting on the prices of labor intensive services had been higher than those on the prices of capital intensive products in 1995, and lower than them in 2000. Hence, it can be concluded that the "supply" asymmetric effect presented in the previous section is balanced by another one for manufactured products.

I suggest an explanation to this asymmetry linked to asymmetries in the shape of the custommers' demand curves, which are revealed by the price-maker power of firms. The

| *Explained Variable* | | | *Difference in Tax Shifting Parameter* | *Std. Error* | *Obs.* | *$R^2$* |
|---|---|---|---|---|---|---|
| *Labor intensive services* | *versus* | *Capital intensive products* | | | | |
| Hairdressing | | Domestic Machines | **40 %** * | 29 % | 9 | 21 % |
| Hairdressing | | Home Repair Products | **38 %** ** | 21 % | 9 | 31 % |
| Hairdressing | | Earthenware | **44 %** * | 29 % | 9 | 25 % |
| Hairdressing | | Crockery | **26 %** | 27 % | 9 | 11 % |
| Domestic Machine Repairs | | Domestic Machines | **46 %** *** | 20 % | 9 | 42 % |
| Domestic Machine Repairs | | Home Repair Products | **44 %** * | 27 % | 9 | 28 % |
| Domestic Machine Repairs | | Earthenware | **51 %** ** | 27 % | 9 | 33 % |
| Domestic Machine Repairs | | Crockery | **32 %** | 29 % | 9 | 15 % |
| Technical Repairs | | Domestic Machines | **78 %** *** | 32 % | 9 | 46 % |
| Technical Repairs | | Home Repair Products | **76 %** *** | 27 % | 9 | 53 % |
| Technical Repairs | | Earthenware | **82 %** *** | 35 % | 9 | 46 % |
| Technical Repairs | | Crockery | **64 %** *** | 26 % | 9 | 46 % |

**Table 7 : Tax shifting comparison at the time of the July 1995 French VAT reform**

*** : Tax shifting difference significant at 5 %
** : Tax shifting difference significant at 10 %
* : Tax shifting difference significant at 20 %

| Explained Variable | | | | | | |
|---|---|---|---|---|---|---|
| *Capital intensive products* | *versus* | *Labor intensive services* | *Difference in Tax Shifting Parameter* | *Std. Error* | *Obs.* | *$R^2$* |
| Domestic Machines | | Hairdressing | **110 %** | 96 % | 9 | 16 % |
| Domestic Machines | | Domestic Machine Repairs | **147 %** * | 97 % | 9 | 25 % |
| Domestic Machines | | Technical Repairs | **111 %** | 104 % | 9 | 14 % |
| Home Repair Products | | Hairdressing | **111 %** *** | 49 % | 9 | 42 % |
| Home Repair Products | | Domestic Machine Repairs | **148 %** *** | 65 % | 9 | 42 % |
| Home Repair Products | | Technical Repairs | **111 %** ** | 61 % | 9 | 32 % |
| Earthenware | | Hairdressing | **79 %** * | 61 % | 9 | 19 % |
| Earthenware | | Domestic Machine Repairs | **116 %** | 95 % | 9 | 18 % |
| Earthenware | | Technical Repairs | **80 %** | 85 % | 9 | 11 % |
| Crockery | | Hairdressing | **68 %** * | 46 % | 9 | 24 % |
| Crockery | | Domestic Machine Repairs | **106 %** * | 73 % | 9 | 23 % |
| Crockery | | Technical Repairs | **68 %** | 67 % | 9 | 13 % |

**Table 8 : Tax shifting comparison at the time of the April 2000 French VAT Reform**

*** : Tax shifting difference significant at 5 %
** : Tax shifting difference significant at 10 %
* : Tax shifting difference significant at 20 %

price-maker power allows the firm to respond in a better way - from a strategic point of view - to the demand's fluctuations, which puts forward the asymmetric properties which may exist in the shape of the custommers' demand curves. As was noted in section 2, on the basis of table 1, the capital intensive industries I study may be considered as price making because of the high fixed costs.

Indeed, if considering the demand problem as tenuous variations around an equilibrium point, figure 3 shows three different kinds of demand curves in a graph where the variation proportion of the demand - that is $\frac{dD}{D}$ - is function of the variation proportion of the price - that is $\frac{dp}{p}$. As the demand elasticity with respect to the prices is $\epsilon = -\frac{p}{D}\frac{dD}{dp}$, this is the graph of the demand elasticity in a space where relative variations of prices are at X-coordinate and relative variations of demand are at Y-coordinate.

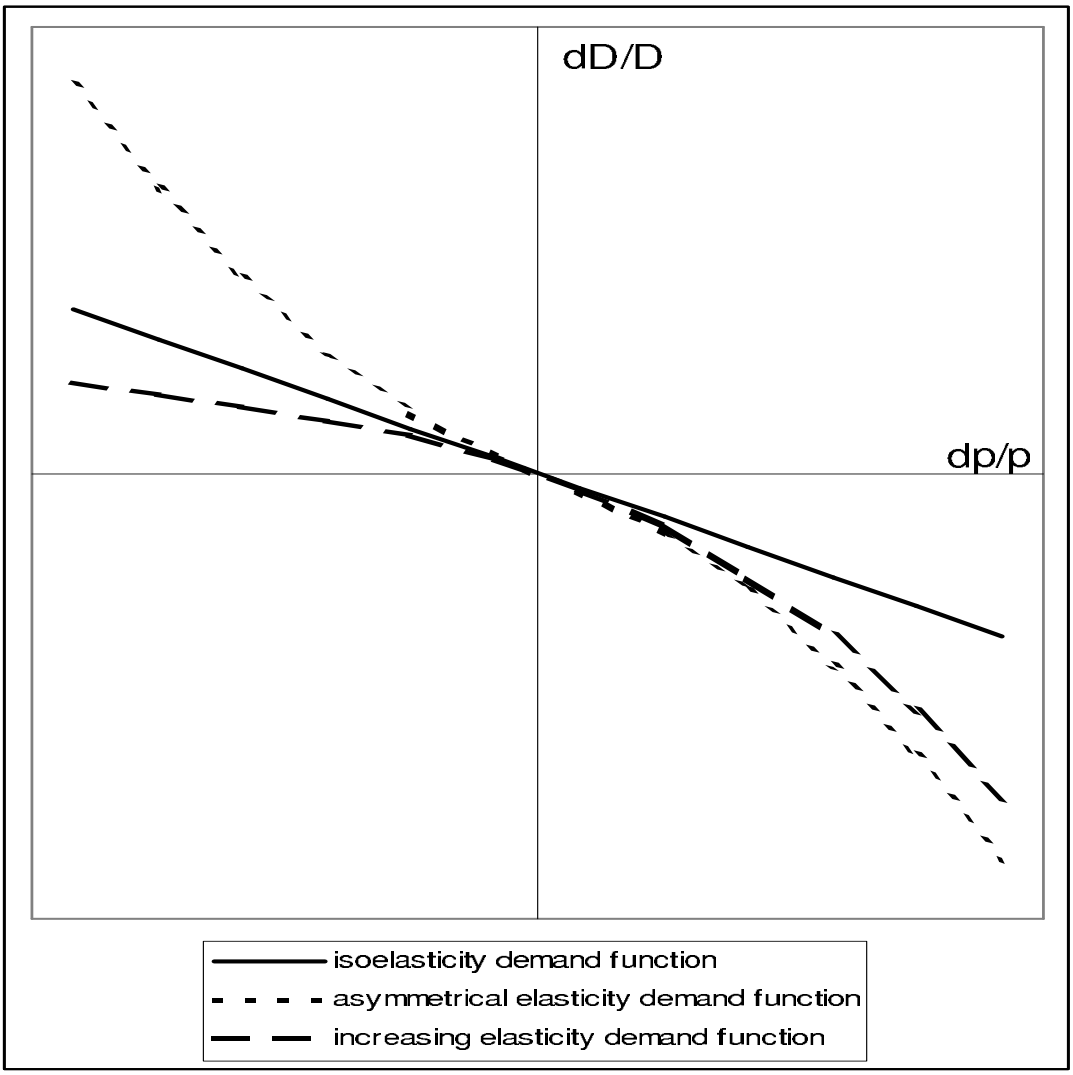


Figure 3: Demand function curves

The simplest and most common way to represent demand variations is through isoelasticity properties, which corresponds to a straight line on figure 3.

However, this does not take psychological and reference point effects into account. These effects may induce that the demand reaction is proportionally bigger when the price variation is higher. Such increasing elasticity properties are known concerning petroleum products (e.g. Walker & Wirl (1993)), and may also be true for other consumption goods. Bénabou & Gertner (1993) explain that demand elasticity with respect to the prices is locally increasing through search for prices arguments. Indeed, the willingness to search for better prices is stronger when the price increases is higher. Therefore, the consumption decreases are proportionnally more important when the price increases are bigger. Such kinds of demand reactions are represented by graphs such as the asymmetric elasticity curve on figure 3.

Economic theorists traditionally use models with increasing elasticities - with constant elasticity as a limit - because on one hand it takes into account the psychological effects for the price increases and on the other hand it is mathematically very regular[4]. However, they might not be the most relevant elasticity profiles. Increasing elasticity profiles assume that demand reactions are stronger when price increases are more important, and that demand reactions are stronger when price decreases are less important. That would mean that the consumption increases are proportionnally smaller when the price decreases are bigger. That could be explained by saturating effects, but these saturating effects are not considered here because the different price variations studied are all small.

Then, I use in the following demand curves that react as increasing elasticity models when prices increase, and whose reaction increases with the price variations when prices are reduced. In order to summarize, it can be said that $\frac{\left|\frac{dD}{D}\right|}{\left|\frac{dp}{p}\right|}$ is increasing with respect to $\left|\frac{dp}{p}\right|$.

Such behaviors are represented by the asymmetric elasticity demand function in figure 3. It is called asymmetric elasticity demand function because the mathematical properties of what it represents are asymmetric in spite of the symmetrical properties of the demand's reactions. Indeed, the demand elasticity increases with respect to the prices when $dp > 0$ and decreases with respect to them when $dp < 0$.

Now, let us introduce such kind of demand functions in a simple model that considers the price-maker power of firms. To make it very clear, let us consider a monopoly firm producing the quantity $Q$ of a good with the cost function $C(Q)$. Knowing the function of customer's demand is $Q^d(p)$ - which is such that $\epsilon_d$, the elasticity with respect to the prices, is always larger than one[5] - the maximisation problem gives as a result :

$$\frac{p}{1+\tau} = \frac{\epsilon_d}{\epsilon_d - 1}\frac{\partial C}{\partial Q} \tag{7}$$

Differentiating equation 7 in an equilibrium path gives, with $F = \frac{p}{\epsilon_d}\frac{\partial \epsilon_d}{\partial p}$ being the elasticity

[4]Indeed, the derivated function sign does not change.

[5]It is what find Ehrenberg & England (1990), Ehrenberg & Scriven (1999) and Scriven & Watson-Gandy (2000) in their emprirical studies, and the basic stability condition for monopoly markets.

with respect to the price of the demand elasticity :

$$x = \frac{1+\tau}{p}\frac{dp}{d\tau} = \frac{1}{1 - \frac{\epsilon_d}{\epsilon_d - 1}(1+\tau)\frac{\partial^2 C}{\partial Q^2}\frac{\partial Q^d}{\partial p} + \frac{F}{\epsilon_d - 1}} \tag{8}$$

As in section 3, tax shifting parameter for the prices is decreasing with respect to the demand reaction $\frac{\partial Q^d}{\partial p}$ and with respect to the marginal cost increase $\frac{\partial^2 C}{\partial Q^2}$ - however, it must be noticed that this marginal cost increase is no longer the inverse of the supply elasticity.

Moreover, one can see there, as it has been said previously, that tax shifting on the prices when firms are price-taker takes in account the price elasticity of the demand elasticity. According to the demand properties previously presented, $F$ is bigger when prices increase than when they decrease, and therefore the tax shifting parameters are smaller upwards than downwards.

This price-taker effect may explain that the asymmetry of the tax shifting on the prices of industrial products, the demand asymmetric effect, is in the opposite direction as the supply asymmetry. In markets with monopolistical firms or with collusion - markets that better consider demand variations because of the price-making power of firms - price increases are relatively weak in order to prevent the fall of the demand, and price decreases are relatively strong in order to take benefit from the takeoff of the demand.

# 6 Tax shifting after big VAT variations

In section 4 was presented an explanation of the supply asymmetrical effect using adjustment costs arguments. An important issue consists in understanding whether or not these adjustment costs are proportional to the output adjustments. More precisely, does there exist considerable fixed adjustment costs ? Indeed, if the adjustment costs are proportional to the output adjustments, the supply asymmetric effect should be the same whatever the VAT rate change is big or small. But if there exists considerable fixed adjustment costs, the supply asymmetric effect should decrease with respect to the importance of the VAT rate decrease.

In order to understand this mechanism, let us use the same notations as in section 4. When $d\tau$ is negative, $dQ$ is positive and $\epsilon_s$ is in inverse proportion to $\frac{\partial^2 C}{\partial Q^2} = |\Delta_1 + \Delta_2|$, where $\Delta_1$ is the second derivative of the cost function and $\Delta_2$ is the adjustement cost. If the adjustment costs consist in fixed costs, then $\Delta_2$ is decreasing with respect to $dQ$ - only $dQ > 0$ are considered here - and so does $\frac{\partial^2 C}{\partial Q^2}$. It follows that $\epsilon_s$ is increasing in $dQ$, and so does the tax shifting parameter.

In this section, I analyse tax shifting on prices after an important VAT rate change in order to answer this question. The suitable reform occured in France on September $1^{st}$ 1999. According to a European experiment, French VAT rate on home repair services had been decreased at this time from the full rate - 20.6% - to the reduced rate - 5.5% -, which

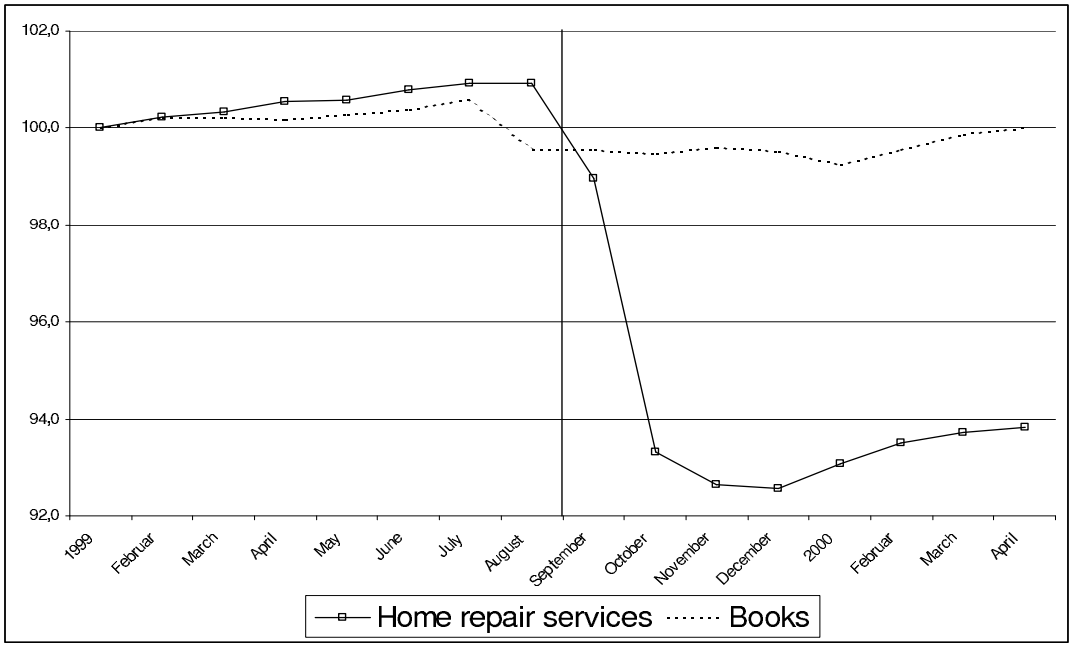


Figure 4: Prices of home repair services around the 1999 French VAT reform

The prices are corrected from an inflation trend estimated as the mean of the book inflation during the 16 month considered.

constitute a big variation. Figure 4 shows the price index of these services around the reform.

Two properties may clearly be seen on figure 4. First of all, the shifting seems to occur very quickly. Secondly, it seems to be very substantial. It should be specified that home repair services are labor intensive services, whose prices should behave as those of hairdressing or domestic machines services. Indeed, I make the same regressions as in section 3 for home repair services [6], the results are that the tax shifting parameter for the prices of these services is 87%, which is indeed intermediate between the tax shifting parameters for the prices of hairdressing and domestic machines repairs.

For the same reasons as for the other labor intensive services, the tax shifting on the prices of home repair services should be very little after small VAT rate decreases. As it has been said previously, the calculation of the tax shifting on the prices of this set of price data after the 1999 huge VAT rate reduction gives informations on the causes of the supply asymmetric effect. Table 9 shows the results of the regression following equation 2 of the home repair services' prices around the 1999 reform.

| *Obs* | $R^2$ | *VAT* ($\beta_0$) | *VAT(t-1)* ($\beta_1$) | *VAT(t-2)* ($\beta_2$) | *VAT(t-3)* ($\beta_3$) | *Tax Shifting Parameter (x)* |
|---|---|---|---|---|---|---|
| 36 | 0.99 | 0.170<br>(0.008) | 0.473<br>(0.008) | 0.075<br>(0.008) | 0.022<br>(0.008) | **74,0 %**<br>(1.6 %) |

**Table 9 : 1999 Tax shifting parameter on prices of home repair services**

[6] I make these regressions only for the 1995 reform, because home repair services, which were taxed at the reduce rate, did not be concerned by the 2000 reform.

Before commenting the results themselves, it must be noticed that they are very significative. More than 99% of the variance is explained by the explicative variables, and all the coefficients are much more significant than 1%.

This regression demonstrate that with an important VAT rate decrease, the two symptoms of the supply asymmetric effect disapear. Firstly, the first two delay coefficients are significantly higher than the last two. Indeed, $\beta_0 + \beta_1 - (\beta_2 + \beta_3) = 0.546$, with a standard error equal to 0.016. Secondly, the tax shifting parameter is hardly smaller than the upwards one. It is 74% downwards and 87% upwards.

Thus, this section shows that the adjustment costs presented in order to explain the supply asymmetrical effect should be mainly fixed costs.

# 7 Conclusions

This paper presents two different asymmetric effects on tax shifting on prices, that occur on different kinds of markets. On competitive markets, firms reflect commodity tax variations more fully when the taxes increase than when they decrease. As an opposite result, on markets with collusion, firms reduce more the prices than they raise them. This might look like a paradox but one must keep in mind that in perfect competition markets, prices are still low, which prevents firms from making important price decreases.

This paper suggests explanations for these two asymmetric effects. Concerning the higher tax shifting parameters upwards than downwards in competitive markets, supply asymmetry arguments are proposed. The existence of fixed adjustment costs may prevent firms from decreasing their prices after small VAT decreases. However, big VAT rate decreases are more strongly shifted on prices.

Concerning the lower tax shifting parameters upwards than downwards in collusive markets, demand asymmetry arguments are proposed. The demand reactions might be stronger after important price variations than after tenuous ones. This might be due to psychological effects or to the shadow price of changing one's consumption habits. Therefore, in markets with monopolistical firms or with collusion - markets that better consider the variations of the demand because of the price making power of firms - price increases are relatively weak in order to prevent the fall of the demand, and price decreases are relatively strong in order to take profit of the takeoff of the demand.

These asymmetric effects take a great importance in the political debate because they put forward the risk of a bias toward high VAT rate. If politicians have a short term bias and make their reforms with the aim of obtaining viewable short run results, the decision of decreasing the VAT rate will rarely be taken. Indeed, amongs the goods subject to the full-rate - which do not take the main part of custommers' budgets - only the capital intensive goods

would reflect commodity tax decreases in the short run. Such bias may occur specially when governments choose a temporarily increase of commodity taxes in order to face transitory budget problems. The temporary reforms might be changed in permanent ones.

However, this bias should be stronger if the asymmetric effects - in particular the supply asymmetric effect - are permanent in the long run. But the theoretical arguments proposed to explain this asymmetry imply that the asymmetric shifts on prices should not be permanent, because restructuration costs and credit constraints are transitory matters. Unfortunately, long run compensations can not be seen in data, and it can not been said for sure if the asymmetric effects presented in these paper are transitory or permanent effects. Nevertheless, the bias toward high VAT rate should be effective, because even if the asymmetric effects are only transitory, the transition time should be long. If not, tax shifting on prices after four month should appear on regressions using more delays.

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