University of Naples Federico II

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Doctor of Philosophy

Essays on competition and incentives

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Contents

Summary

Evidence on the causal effect of competition on markup

A number of authors have recently documented a worldwide upward trend in markup and concentration since 2000 (for instance, Barkai, 2017; De Loecker and Eeckhout, 2017; Bessen, 2017; De Loecker and Eeckhout, 2018; Autor et al., 2017; Gutiérrez and Philippon, 2018; Crouzet and Eberly, 2019; Díez et al., 2019; Hartman-Glaser et al., 2019). The concern over the possibility of increasing monopoly power has spurred studies where the relationship between market power and competition is the common thread. However, the analytical approach often adopted—based on market concentration as explanatory variable of markups—faces severe measurement problems and worse conceptual problems as there are numerous, quite different economic scenarios that can result in the same correlation between markups and concentration (Berry et al., 2019). In fact, the latter is not an economic primitive but instead a measure of market outcome, thus it can be uninformative or, worse, misleading about the causal effect of competition (Syverson, 2019).

We contribute evidence on the effects of competition on markups and profits, relying on a quasi-experiment. We exploit measures of plausibly exogenous variations in the degree of market competition at a local level, by exploiting an Italian law which, upon evidence of relationship between firms' owners and mafia groups, mandates the expropriation of property rights of the formers to undermine the economic power of *mafiosi* through the destruction of their heritage. Firms and other real estates are seized or confiscated when their owners—eventually already targeted by the personal prevention measures—are not able to explain the legal origin of the goods. Information about seized-confiscated firms can be used to construct a measure of an exogenous firms' exit shock very similar to the death shock assumed in many theoretical models where competition is affected by the creation and destruction of firms, such as Bilbiie et al. (Forthcoming). This measure can be used directly as explanatory variable itself in an empirical model of markup and profit variations to estimate the causal effect of change in the strength of competition (Syverson, 2019).

The quasi-randomness of the firm's destruction shock rests on the fact that the police investigation and the emergence of the incriminating evidence leading to the confiscation of the firm is unrelated to the activity of the firm itself as well as to fluctuations in local economic activity: before to be confiscated firms operate legally, the confiscation being due to other illegal activities of the owner of the firm or its frontman. Moreover, the identification of the causal effect due to the shock, that is the validity of the exclusion restriction, builds on the fact that we use firm-level panel data at municipality level. Hence, we may look at time-variations in markups of firms operating in local markets, due to the unanticipated change in the number of firms within a given sector. These characteristics of our framework allow to take into account a potential concern related to the possibility that our sample is affected by a self selection issue, namely an entrepreneur might choose to open up a company in some regions with the specific aim of either avoiding mafia environment or being closer to the mafia environment, thus inducing potential endogeneity in firm location.

A related concern could have been raised if confiscation was the consequence of mafia infiltration in a firm, thus potentially invalidating the quasi-randomness of the firm's destruction shock. As made clear before, any confiscated firm cannot be labelled as 'mafia-firm', thus it does not apply the concern that, say, high-markup firms are infiltrated by mafia associations or they have higher than average markups because they are 'mafia-firms'. More in general, this implies that confiscated firms are unrelated to the state of competition.

In general, many factors related to cost conditions, demand conditions, and pricing environment might lead to rising markups. The rise in market power due to the softening of the degree of market competitiveness—because of increased regulations or the decline of antitrust enforcement—is one advocated possibility (Gutiérrez and Philippon, 2017; Wollmann, 2019; Mantovani et al., 2017). De Loecker et al. (2016) find an incomplete cost pass-through to prices as the immediate consequence of the India's trade liberalization episode. Producers benefited relative to consumers after the pro-competitive reform as they offset their reductions in marginal costs due to the liberalization by raising markups. The main consequence of less competition pushing up market power, markups, and profits, would have been a drop in the rate of investment. By instrumenting for industry concentration using excess entry, Gutiérrez and Philippon (2017) find that concentration is negatively correlated with investment rates. The way concentration and markups are measured also matter for the main issue. If industry averages are used to calculate markups and concentration is measured by the fraction of workers employed at large firms (10,000 or more workers), then the relationship between concentration and markups is less clearcut.

In addition to the literature on trend in market power, our work is also related to the literature on endogenous markup variations over the business cycle, originating with Rotemberg and Woodford (1992).

A number of contributions to this literature imply that markups decrease with the number of firms or goods available. A market structure characterized by monopolistically competitive firms producing intermediate inputs or final goods is exploited by Gali (1995), Jaimovich (2007), Jaimovich and Floetotto (2008) and Bilbiie et al. (2012) among others. In this framework the degree of substitutability among varieties may generate a negative link between markups and the number of firms. In particular, the assumption of translog expenditure function generates demand-side pricing complementarities as the elasticity of substitution increases with the number of firms (Bilbiie et al., 2012). Cournot competition drives a similar inverse relationship between markups and the number of firms as competitive pressure affects the price elasticity of demand (Gali and Zilibotti, 1995; Etro and Colciago, 2010; Bertoletti and Etro, 2016).[1] The assumptions made by Boar and Midrigan (2019) on the demand system also imply that the demand elasticity a producer faces decreases in its market share: larger producers charge higher markups and more competition reduces markups. Broda and Weinstein (2010) provide empirical evidence on product creation and destruction.[2]

Assessing whether markups depend on the number of firms and competition is also relevant for welfare analysis. The dynamic model with monopolistic competition and product variety developed by Bilbiie et al. (2012) suggests that market and planner equilibria are equivalent only under Dixit-Stiglitz preferences (implying constant markup), otherwise the market equilibrium would be inefficient (Bilbiie et al., Forthcoming). The welfare costs of markups may be large. When production factors (labor and physical capital) are elastic, the total welfare cost associated with markups and inefficient product varieties may rise up to 25 percent of consumption (Bilbiie et al., Forthcoming).[3] Boar and Midrigan (2019) show that households may benefit from policies that remove the distortions due to markup dispersion even though they lead to higher markups and concentration. By benefiting workers at the expense of the relatively

[1] A similar relationship is postulated by Comin and Gertler (2006). See Etro (2014) for a survey of models of endogenous market structure.

[2] Models discussed above usually predict countercyclical markup variations as almost all New Keynesian models based on price and/or wage rigidities (for instance, Christiano et al., 2011; Woodford, 2011). Nekarda and Ramey (2019) provides recent evidence on the cyclicality of aggregate price-cost markup and the related effects of a policy change. Anderson et al. (2018) find that (in the retail sector) markups are relatively stable over time and characterized by large regional dispersion positively correlated with local income. By relying on a new empirical framework, Corsetti et al. (2018) conclude for substantial heterogeneity in destination-specific markup elasticities across product classes and firm types suggesting that pricing responds to global, rather than local, economic conditions. See also Bils (1987).

[3] Policies aimed at reducing the costs of markups are not trivial. A policy aimed at eliminating markups, and inducing marginal-cost pricing, would affect firms' entry incentives and have undesirable effects; whereas a policy of subsidizing labor and physical capital can restore optimality without affecting the entry margin. These results highlight the importance of preserving the optimal (from the standpoint of generating the welfare-maximizing level of product variety) amount of monopoly profits in economies in which firm entry is costly.

rich entrepreneurs such policies reduce inequality.[4] The benchmark calibration in Edmond et al. (2019) suggests that the representative consumer would gain 6.6 percent in consumption-equivalent terms if all markup distortions were eliminated. In line with these results, Taiwanese data suggest that gains from increased competition that reduces misallocation due to markup distortions may be large (Edmond et al., 2015).

This essay adds to research that exploits Italian laws issued to combat the mafias to design quasi-experiments (Acconcia et al., 2014b,a). While Acconcia et al. (2014b) look at the effect of the accomplice-witness program on crime deterrence and prosecution, Acconcia et al. (2014a) take advantage of compulsory administration—due to city-council dismissal because of mafia infiltration—to measure the size of the public spending multiplier, in the current essay we exploit the confiscation of firms to investigate about the relationship between markup and competition.

Cournot competition and number of firms

Consider the inverse linear demand of a homogeneous good produced by n firms $i = 1, ..., n$, each one producing output q_i:

$$p = a - \sum_{i=1}^{n} q_i \tag{1}$$

where $a > 0$ is a parameter representing the size of the market. To produce, any firm incurs in a fixed cost $k > 0$ and a variable cost cq_i where $c > 0$ is a constant marginal cost of production.

Solving the profit maximization problem of the firms competing as Cournot will lead to the following results:

$$q(n)_i = \frac{(a-c)}{(n+1)} \tag{2}$$

$$p(n) = \frac{(a+nc)}{(n+1)} \tag{3}$$

$$\pi(n) = \frac{(a-c)^2}{(n+1)^2} - k \tag{4}$$

$$\mu = \frac{p(n)}{c} = \frac{(a-c)}{(n+1)} \tag{5}$$

thus, an inverse relationship between price-cost margins and number of firms emerge. Similarly firm profit is decreasing with respect to the number of competitors.

We can consider the possibility that firms are free to enter the market as long as they can afford to pay the fixed cost. An upper-bound for the number of firms is due by n^* corresponding to the zero profit condition $\pi(n^*) = 0$:

[4] In contrast, policies that reduce firm concentration lead to large output and TFP losses and increase inequality.

$$n^* = a - c\sqrt{k} - 1 \tag{6}$$

at the upper-bound, the equilibrium output is $q_i = \sqrt{k}$, the total production is $Q = a - c - \sqrt{k}$, and the equilibrium price is $p = c + \sqrt{k}$ which implies a markup on the marginal cost to cover the fixed cost of production.

We can consider two different shocks:

- k changes, thus the number of firms changes. The markup changes, while the profit remains constant;
- n changes, thus profit and markup both change, accordingly.

The institutional setting

The quasi-experiment we are going to investigate relies on the so-called prevention measures—seizure, confiscation—of properties, belonging to individuals already subjected to personal prevention measures. Thus, we exploit measures of plausibly exogenous variations in the degree of market competition at a local level, by exploiting an Italian law.

We briefly highlight the main characteristics of the institutional setting which we exploit for the purpose of our research and the peculiarities this setting has in order to make us confident about talking of a quasi-random change in the degree of competition.

Personal prevention measures are employed to track dangerous individuals involved in criminal activities or that are anyway used to commit crimes; they can be applied by the police commissioner or by the judicial authority. Those applied by the judicial authority can also be addressed to individuals suspected of belonging to *mafia*-type criminal associations, according to the art. 416-bis of Penal Code. Property prevention measures are seizure or confiscation; they involve any property belonging to individuals involved in personal prevention measures.

Seizure—chronologically the first property prevention measures—requires the suspicious that the property is the outcome or the tool of an illegal activity; confiscation takes place if during a trial the defendant is not able to prove the legal origin of his property. In this research, property prevention measures are exploited as an exogenous shock to the number of firms in a local market.

It can happen however, that preventive seizure and confiscation can be also arranged in relation to assets already seized in a criminal proceedings.

This institutional setting sheds light on our purpose of quasi-randomness of the shock to firms under prevention measure, in fact these firms cannot be identified as being illegal economic activities, they are just companies in the property or at the disposal of an individual under prevention measures. Moreover,

we want to stress the concept that seized or confiscated firms are firms operating legally in the local economic activity. They experience these compulsory measures exclusively because they are in the property or at the disposal of an individual somehow involved in criminal activities or an individual involved in a relationship with figures belonging to a *mafia* type criminal organization according to the art. 416-bis of Penal Code. We sustain the quasi-randomness of firms' destruction shock aware of the fact that we are not taking in consideration firms that can be labelled as '*mafia*-firms'. We focus on firms that do not operate in a sub-legal contest and, more important, they are not confiscated because they are infiltrated by the *mafia*. No concern of self selection can arise due to a potential correlation between the shock of our interest and state of competition.

The fact that firms under our analysis are alien to pure *mafia* activity is clear from the main aim of the authority (ANBSC) responsible to discipline the destination process, the final step of the firm after having experienced seizure, confiscation and compulsory administration. The aim is to fully preserve employment levels and the economic activity, in line with the Law, art. 48 of the D.L. 06/09/2011 n. 519, Codice anti*mafia*.

Aside from the final destination of the firm, we investigate as measure of firm's exit shock, the breakdown to the normal economic activity of the firm. In fact, after the seizure the firm is managed by an administrator, assisted by (ANBSC),[5] she faces several problems that interfere with the actual economic presence of the firm into the market:

- the Law precludes the possibility of renting the firm before the destination, creating difficulties for the administrator that does not have the disposal of resources to face the management and the maintenance of the firms;
- the administrator gets the assignment following the adoption of the court of his report on the business prospects of the firm. This process takes at least six months, creating a crucial gap in time that compromises firms' chance to be re-inserted in the market;
- the administrator acts cannot go beyond ordinary administration, implying the risk of a slow and ineffective management.[6]

Main results

The empirical models we are going to estimate are:

[5]The Code establishes that concomitantly with seizure measure issued by the court, the judge has to elect a legal administrator.

[6]Beni sequestrati e confiscati alla criminalità organizzata: disciplina, criticità e proposte, Fondazione del Monte.

$$Markup_{i,m,t} = \alpha_0 + \alpha_1 ExitYear_{m,t} + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,t} \tag{7}$$

$$Labour\,share_{i,m,t} = \alpha_0 + \alpha_1 ExitYear_{m,t} + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,t} \tag{8}$$

where $Markup_{i,m,t}$ is the markup for firm i at time t whose headquarter is in municipality m, $Labour\,share_{i,m,t}$ is the labour share for firm i at time t whose headquarter is in municipality m, $ExitYear_{m,t}$ is a dummy with value one when a municipality is involved in an episode of *seizure-confiscation* in a given year t, and zero otherwise. We also control for time (α_t), region (α_r) and sector (α_s) fixed effects.

Table 1: ExitYear effect on Markup and Labour share

	(1)	(2)
	Markup	Labour share
ExitYear	0.820***	-0.173***
	(14.43)	(-6.54)
Constant	115.5***	12.95***
	(387.65)	(93.95)
N	974,276	997,619
Sector	Yes	Yes
Year	Yes	Yes
Region	Yes	Yes

Note: Markup is the ratio (times 100) between *Revenues from sales and performances* divided by the sum of costs relative to *Raw materials and consumption*, *Services*, and *Payroll*. Labour share is the ratio (times 100) between *Payroll* and *Revenues from sales and performances*. ExitYear is a dummy with value one for when a municipality is involved in an episode of *seizure-confiscation* in a given year, and zero otherwise. The sample consists just of municipalities involved in treatment episodes. Significance levels: * < 10% ** < 5% *** < 1%. t statistics in parenthesis.

In Table 1 we look at the effect on markup and labour share of a change in the number of firms due to the unanticipated negative shock driven by the *seizure-confiscation* episode. Results show that due to the treatment markup increases by 0.8 percentage points while labour share reduces by 0.2 percentage points.

The idea behind the decline in labour share can in principle have two sources, both connected with profits and markups. On one hand, in the absence of market power and zero profits, one explanation for the labour share to go down may be the change in technology towards fixed factors different from labour, which can shrink the demand of labour, thus a positive markup would be just indicative of a firm covering this new overhead costs derived from the change in technology. On the other hand, in the presence of market power, positive profits and overhead costs, also composed by the fixed part of labour costs, if technology is fixed but there is an decrease in competition, labour share decreases consequently to an increase in markup, that covers all the fixed costs and contemporaneously generates profits. From the stylized Cournot model with endogenous entry we observe that when the number of firms decreases, there is an increase in markup, an increase in prices, a decrease in quantity which leads to a decline in labour demand; the decline in labour demand shrinks nominal wages and due to the increase of prices, real wages go down even more.

Overall, results support the theoretical idea that a reduction in the number of firms leads to an increase in market power, suggesting that imperfect competition is a realistic representation of how local market behaves. Moreover, results also confirm Autor et al. (2017) and De Loecker and Eeckhout (2017) insights that a rise in markup is consistent with a decline in the labour share.

Fiscal stimulus and consumption: Revisiting the "Bonus Renzi" case study

Governments would like to smooth out effects of recessions implementing countercyclical fiscal stimulus. Recent researches studied the effects of these stimulus to understand the role of cash on hand. For instance, a number of studies analysed the episodes of tax rebates authorized by the US Congress in the last two downturns of 2001 and 2008 (Johnson et al., 2006; Parker et al., 2013; Misra and Surico, 2014; Shapiro and Slemrod, 2003, 2009; Agarwal et al., 2007; Broda and Parker, 2014; Kaplan and Violante, 2014). Contrary to the predictions of the standard PI-LC model, the response to the fiscal stimulus is not homogeneous across households mainly because of differences in terms of liquidity and debt.[1] In a first stage, wealth of households and their disposable liquidity were considered a leading element of heterogeneity in consumer response: some examples in Shapiro and Slemrod (2003) which supported the idea that wealth was one of the most powerful predictor of the spending rate; Johnson et al. (2006); Parker et al. (2013) bringing evidence that the consumption response to the rebates in US was larger for households with low liquid wealth or low income. In a second stage, Kaplan and Violante (2014) introduced a new way of thinking about heterogeneous responses of households to countercyclical fiscal stimulus. They proposed a quantitative framework that considers both liquid and illiquid wealth, rather than net worth alone. They captured the presence of wealthy hand to mouth consumers: households holding sizable amounts of wealth in illiquid assets, such as housing or retirement accounts but have very little or no liquid wealth, and as a result consume all of their disposable income every period. Clearly, such households would not be picked up by standard measurements since they have positive -and often substantial- net worth. Their results showed that wealthy hand to mouth consumers have a high marginal propensity to consume out of transitory income changes.

Misra and Surico (2014), on the heels of Kaplan and Violante (2014), focused on how consumption behaviour varies by household mortgage debt and wealth. They found that the consumption of mortgage-holders responds more strongly to tax credit measures than liquid homeowners. Baker (2018) moreover found that highly-indebted households are more sensitive to income fluctuations and that a one standard deviation increase in debt-to-asset ratios increases the elasticity of consumption by approximately 25%. Acconcia et al. (Forthcoming) exploited the quasi-experimental nature of public programs in support of homeowners residing in earthquake areas, which received reconstruction funds. They found that con-

[1] Standard theory predicts consumers to choose optimal consumption based both on current and expected income, thus she/he will save enough to keep the consumption stable over time and transitory income shocks will be spread on the lifetime left. This suggests that the marginal propensity to consume should be equal among consumers and transitory income shocks only slightly alter consumption decision when unexpected.

sumption by liquid homeowners in the disaster area is no different from that by homeowners outside the disaster area. By contrast, the consumption by illiquid households rises quite markedly.

We contribute to this recent field of the literature that focused on how consumption behaviour varies by household mortgage debt, wealth and liquidity. To the purpose of our research we exploit a countercyclical tax rebate episode occurred in Italy in 2014, widely know as "Bonus Renzi". This bonus represents a reduction in the "tax wedge" and, when implemented, was thought as aimed at smoothing out the effects of the economic recession.

We study the effects of this bonus on households consumption aware of the new literature contributions, trying to capture the heterogeneity in consumer response to the intervention. In our study we want to exploit heterogeneity across consumer responses to the stimulus. Following the literature we treat separately households with and without homeowners. Moreover, among homeowners, liquidity constraint condition and mortgage status are investigated separately, following Kaplan and Violante (2014); Misra and Surico (2014); Acconcia et al. (Forthcoming). This approach highlights the idea that agents response is different because among homeowners, who has a mortgage has different expenditure with respect to other homeowners, moreover the response can be different if you consider also the dimension of illiquidity, which we are going to measure as cash and bank deposits amounting to less than 50 percent of disposable income.

Our study bears on the biannual Bank of Italy's Survey of Households' Income and Wealth (SHIW). In 2015 the Survey was conducted for 2014 and covered 8,156 households. In this case it was inserted a section of questions in which respondents were asked how many people in their family were "Bonus Renzi" beneficiaries in 2014. The Survey has complete information about disposable income, housing status, bank account and debt situation, allowing us to investigate the role of dfferent characteristics of households, namely whether they are homeowners and the presence of liquidity contraints and mortgage debt.

Table 1 presents results of a difference-in-differences model, which allows us to estimate the effect of the bonus on households consumption. We consider only homeowners and the sample is split according to liquidity status. The left-hand side is the two-year change of consumption for food, distinguishing consumption for food at home and consumption for food outside home. When we consider the sample of liquid homeowners, the coefficient of *Bonus* indicates the change in consumption of liquid homeowners that have benefited from the rebate, after the rebate was implemented; the control group consists of liquid homeowners non bonus beneficiary. A similar definition applies for the sample of illiquid homeowners.

Table 1: Bonus effects on homeowners food consumption

	(1)	(2)	(3)	(4)
	Home-Food	Non-Home-Food	Home-Food	Non-Home-Food
Bonus	490.9**	-13.37	-164.3	-359.7
	(3.09)	(-0.11)	(-0.71)	(-1.67)
$\Delta Income$	0.0330***	0.0122***	0.0226***	0.00605
	(5.10)	(4.29)	(3.78)	(1.25)
N	2,410	2,410	656	656
Illiquid	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes

[1] Note: Table reports results of empirical specifications having the two-year change of homeowners nondurable food consumption, at home or outside home, on the left-hand side. *Bonus* is a dummy taking value one if the household has at least one member being bonus beneficiary in 2014; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 1 shows a significant impact of the bonus on consumption for food at home among liquid homeowners, the impact is not significant for illiquid homeowners. No significant effect arises, both for liquid and illiquid homeowners, when the left-hand side variable is the two-year change of consumption for food outside home.

Table 2 presents results of a difference-in-differences model, which allows us to estimate the effect of the bonus on households consumption, allowing for heterogeneous responses depending on households level of mortgage. The sample is split according to housing and liquidity status. The left-hand side is the two-year change of home durable consumption.

Table 2: Bonus effects on home durable consumption.

	(1)	(2)	(3)
	ILLIQUID	LIQUD	OTHERS
Bonus*Debt	186.8**	50.09	1.840
	(2.84)	(0.73)	(0.02)
Bonus	-318.1	182.8	-56.15
	(-1.43)	(1.25)	(-0.56)
Debt	-18.14	-55.82	4.975
	(-1.52)	(-1.58)	(0.06)
$\Delta Income$	0.00204	0.00397	0.00856
	(0.51)	(0.94)	(1.64)
N	672	2,552	1,234
Owners	Yes	Yes	No
Controls	Yes	Yes	Yes

[1] Note: Table reports results of empirical specifications having the two-year change of home durable consumption on the left-hand side. *Bonus* is a dummy taking the value of one if the household had at least one bonus beneficiary in 2014; *Debt* is the amount of mortgage debt of the household; $Bonus * Debt$ is the interaction term; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

The coefficient of $Bonus * Debt$ in Table 2, first column, indicates the change in consumption of illiquid homeowners that have benefited from the rebate and have a level of mortgage debt different from zero; the coefficient of $Bonus * Debt$, in the second column, indicates the change in consumption of liquid homeowners that have benefited from the rebate and have a level of mortgage debt different from zero; the coefficient of $Bonus * Debt$, in the third column, indicates the change in consumption of non-homeowners that have benefites from the rebate and have a level of mortgage debt different from zero.
In Table 2 results confirm the idea that considering both mortgage debt, liquidity and housing status is crucial in studying the response of households consumption to countercyclical fiscal stimulus. In particular, results clearly show that among illiquid homeowners the effect on home durable consumption, due to the bonus, is almost null when the mortgage debt is close to zero, while the effect reaches 187 euro—statistically significant—when it is considered an illiquid homeowner with ten thousand euro mortgage debt. The effect is not statistically significant, instead, among liquid homeowners and non-homeowners, even when we consider a relatively high level of mortgage debt.
The effect of the "Bonus Renzi" has been already investigated:

- Gagliarducci and Guiso (2015) presented a Regression Discontinuity Design, they showed evidence of a strong effect of the bonus on non home durable consumption, even stronger for food. They concluded that on average 60 euro per month of the rebate were spent in food.

- Neri et al. (2017) found that households that received the tax rebate increased their monthly consumption of food and means of transportation by about 20 and 30 euro per month. There was a larger increase for households with low liquid wealth or low income.

To summarize, our evidence replicates the result by Gagliarducci and Guiso (2015) that the bonus stimulated food consumption and adds to this conclusion the suggestion that the effect is completely due to liquid homeowners. Moreover, we also provided evidence that illiquid homeowners characterized by relative high level of debt, instead, increased their spending for home durable goods. Thus the entire bonus seems to have stimulated spending for home goods. We did not find evidence that spending increment has been larger than the amount of the bonus.

Chapter 1

Evidence on the causal effect of competition on markup

Contents

1 Introduction

A number of authors have recently documented a worldwide upward trend in markup and concentration since 2000 (for instance, Barkai, 2017; De Loecker and Eeckhout, 2017; Bessen, 2017; De Loecker and Eeckhout, 2018; Autor et al., 2017; Gutiérrez and Philippon, 2018; Crouzet and Eberly, 2019; Díez et al., 2019; Hartman-Glaser et al., 2019). The concern over the possibility of increasing monopoly power has spurred studies where the relationship between market power and competition is the common thread. However, the analytical approach often adopted—based on market concentration as explanatory variable of markups—faces severe measurement problems and worse conceptual problems as there are numerous, quite different economic scenarios that can result in the same correlation between markups and concentration (Berry et al., 2019). In fact, the latter is not an economic primitive but instead a measure of market outcome, thus it can be uninformative or, worse, misleading about the causal effect of competition (Syverson, 2019).

We contribute evidence on the effects of competition on markups and profits, relying on a quasi-experiment. We exploit measures of plausibly exogenous variations in the degree of market competition at a local level, by exploiting an Italian law which, upon evidence of relationship between firms' owners and mafia groups, mandates the expropriation of property rights of the formers to undermine the economic power of *mafiosi* through the destruction of their heritage. Firms and other real estates are seized or confiscated when their owners—eventually already targeted by the personal prevention measures—are not able to explain the legal origin of the goods. Information about seized-confiscated firms can be used to construct a measure of an exogenous firms' exit shock very similar to the death shock assumed in many theoretical models where competition is affected by the creation and destruction of firms, such as Bilbiie et al. (Forthcoming). This measure can be used directly as explanatory variable itself in an empirical model of markup and profit variations to estimate the causal effect of change in the strength of competition (Syverson, 2019).

The quasi-randomness of the firm's destruction shock rests on the fact that the police investigation and the emergence of the incriminating evidence leading to the confiscation of the firm is unrelated to the activity of the firm itself as well as to fluctuations in local economic activity: before to be confiscated firms operate legally, the confiscation being due to other illegal activities of the owner of the firm or its frontman. The identification of the causal effect due to the shock, that is the validity of the exclusion restriction, builds on the fact that we use firm-level panel data at municipality level. Hence, we may look at time-variations in markups of firms operating in local markets, due to the unanticipated change in the number of firms within a given sector. These characteristics of our framework allow to take into

account a potential concern related to the possibility that our sample is affected by a self selection issue, namely an entrepreneur might choose to open up a company in some regions with the specific aim of either avoiding mafia environment or being closer to the mafia environment, thus inducing potential endogeneity in firm location. A related concern could have been raised if confiscation was the consequence of mafia infiltration in a firm, thus potentially invalidating the quasi-randomness of the firm's destruction shock. As made clear before, any confiscated firm cannot be labelled as 'mafia-firm', thus it does not apply the concern that, say, high-markup firms are infiltrated by mafia associations or they have higher than average markups because they are 'mafia-firms'. More in general, this implies that confiscated firms are unrelated to the state of competition

In general, many factors related to cost conditions, demand conditions, and pricing environment might lead to rising markups.[1] The rise in market power due to the softening of the degree of market competitiveness—because of increased regulations or the decline of antitrust enforcement—is one advocated possibility (Gutiérrez and Philippon, 2017a; Wollmann, 2019; Mantovani et al., 2017). De Loecker et al. (2016) find an incomplete cost pass-through to prices as the immediate consequence of the India's trade liberalization episode. Producers benefited relative to consumers after the pro-competitive reform as they offset their reductions in marginal costs due to the liberalization by raising markups. The main consequence of less competition pushing up market power, markups, and profits, would have been a drop in the rate of investment. By instrumenting for industry concentration using excess entry, Gutiérrez and Philippon (2017a) find that concentration is negatively correlated with investment rates.[2] The efficiency-enhancing shifts suggested by Autor et al. (2017) provide an alternative explanation for the trend in concentration to the market power-markup story. The way concentration and markups are measured also matter for the main issue. If industry averages are used to calculate markups and concentration is measured by the fraction of workers employed at large firms (10,000 or more workers), then the relationship between concentration and markups is less clearcut. Hence, it seems unlikely that rising concentration played much of a role in the general increase in market power that probably occurred over the last two decades (Hall, 2018).[3] To the extent that increased concentration have been accompanied by efficiency gains, caution is again warranted when using concentration as a metric to infer market power (Syverson, 2019): increased

[1] Berry et al. (2019) discuss some possibilities related to primitives of modern industrial organization.

[2] More evidence and discussions about the evolution of investment in the United Staes is provided by Gutiérrez and Philippon (2017b).

[3] In particular, Hall argues that there is no evidence that mega-firm-intensive sectors have higher price/marginal cost markups, but some evidence that markups grew in sectors with rising mega-firm intensity. Moreover, using industry averages to calculate markups as done by Hall shows a much slower increase in markups. De Loecker et al. (2018) explains Hall's evidence as due to the absence of aggregation of the micro level observations and the fact that most of the rise in market power occurs within industry.

concentration and higher profits do not necessarily imply growth in market power. Hence, more research is needed.[4]

In addition to the literature on trend in market power, our work is also related to the literature on endogenous markup variations over the business cycle, originating with Rotemberg and Woodford (1992). A number of contributions to this literature imply that markups decrease with the number of firms or goods available. A market structure characterized by monopolistically competitive firms producing intermediate inputs or final goods is exploited by Gali (1995), Jaimovich (2007), Jaimovich and Floetotto (2008) and Bilbiie et al. (2012) among others. In this framework the degree of substitutability among varieties may generate a negative link between markups and the number of firms. In particular, the assumption of translog expenditure function generates demand-side pricing complementarities as the elasticity of substitution increases with the number of firms (Bilbiie et al., 2012). Cournot competition drives a similar inverse relationship between markups and the number of firms as competitive pressure affects the price elasticity of demand (Gali and Zilibotti, 1995; Etro and Colciago, 2010; Bertoletti and Etro, 2016).[5] The assumptions made by Boar and Midrigan (2019) on the demand system also imply that the demand elasticity a producer faces decreases in its market share: larger producers charge higher markups and more competition reduces markups. Broda and Weinstein (2010) provide empirical evidence on product creation and destruction.[6]

Assessing whether markups depend on the number of firms and competition is also relevant for welfare analysis. The dynamic model with monopolistic competition and product variety developed by Bilbiie et al. (2012) suggests that market and planner equilibria are equivalent only under Dixit-Stiglitz preferences (implying constant markup), otherwise the market equilibrium would be inefficient (Bilbiie et al., Forthcoming). The welfare costs of markups may be large. When production factors (labor and physical capital) are elastic, the total welfare cost associated with markups and inefficient product varieties may

[4]For the period 1992-2005 Feenstra and Weinstein (2017) find that as a result of globalization and implied fall in markups and increase in product variety due to higher imports, US welfare rose by nearly 1 percent. Karabarbounis and Neiman (2013) investigate the recent trend in the labor share.

[5]A similar relationship is postulated by Comin and Gertler (2006). See Etro (2014) for a survey of models of endogenous market structure.

[6]Models discussed above usually predict countercyclical markup variations as almost all New Keynesian models based on price and/or wage rigidities (for instance, Christiano et al., 2011; Woodford, 2011). Nekarda and Ramey (2019) provides recent evidence on the cyclicality of aggregate price-cost markup and the related effects of a policy change. Anderson et al. (2018) find that (in the retail sector) markups are relatively stable over time and characterized by large regional dispersion positively correlated with local income. By relying on a new empirical framework, Corsetti et al. (2018) conclude for substantial heterogeneity in destination-specific markup elasticities across product classes and firm types suggesting that pricing responds to global, rather than local, economic conditions. See also Bils (1987).

rise up to 25 percent of consumption (Bilbiie et al., Forthcoming).[7] Boar and Midrigan (2019) show that households may benefit from policies that remove the distortions due to markup dispersion even though they lead to higher markups and concentration. By benefiting workers at the expense of the relatively rich entrepreneurs such policies reduce inequality.[8] The benchmark calibration in Edmond et al. (2019) suggests that the representative consumer would gain 6.6 percent in consumption-equivalent terms if all markup distortions were eliminated. In line with these results, Taiwanese data suggest that gains from increased competition that reduces misallocation due to markup distortions may be large (Edmond et al., 2015).

This essay adds to research that exploits Italian laws issued to combat the mafias to design quasi-experiments (Acconcia et al., 2014b,a). While Acconcia et al. (2014b) look at the effect of the accomplice-witness program on crime deterrence and prosecution, Acconcia et al. (2014a) take advantage of compulsory administration—due to city-council dismissal because of mafia infiltration—to measure the size of the public spending multiplier, in the current essay we exploit the confiscation of firms to investigate about the relationship between markup and competition. [9]

2 Firms profitability and markup

Average markups changed across the economy over time, especially in the last thirty years. Figure 1 shows that it is possible to compare markup evolution in Europe, North America, Asia and Oceania; in these countries markups increase from being around 1-1.2 to being around 1.5-1.7, meaning that they increase of around 0.4-0.6. Markup trend in these four regions is increasing, while, in the emerging economies of South America the average markup is flat or even decreasing, though it has been high from the start of the data availability. In Africa, until 2000 markup increases and then drops and remains fairly flat and around 1.6. Moreover, in all countries markup reaches at least 1.4. (De Loecker and Eeckhout, 2018)

[7] Policies aimed at reducing the costs of markups are not trivial. A policy aimed at eliminating markups, and inducing marginal-cost pricing, would affect firms' entry incentives and have undesirable effects; whereas a policy of subsidizing labor and physical capital can restore optimality without affecting the entry margin. These results highlight the importance of preserving the optimal (from the standpoint of generating the welfare-maximizing level of product variety) amount of monopoly profits in economies in which firm entry is costly.

[8] In contrast, policies that reduce firm concentration lead to large output and TFP losses and increase inequality.

[9] A wide debate and literature about Italian criminal organizations initiated with Gambetta (1993). In particular, Daniele and Geys (2015) provide an assessment of the law allowing city-council dismissal while Galletta (2017) and Cataldo and Mastrorocco (2019) use such law to study the impact of mafia infiltration within local governments. Information at regional level about a subset of confiscated firms—those that after a trial are allocated to other uses—has been previously employed by Alfano et al. (2019) who show that such firms were mainly operative in regions characterized by the dismissal of city councils. See also Gagliarducci-Manacorda-2016.

Figure 1: The Evolution of Global Average Markups (1980-2014)

(De Loecker and Eeckhout, 2018)

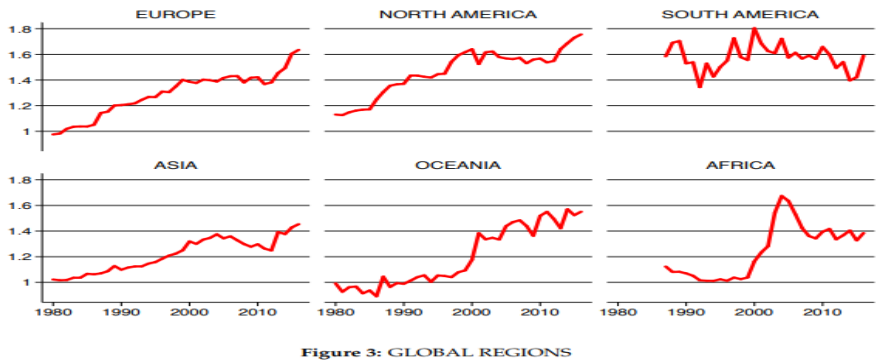


Figure 3: GLOBAL REGIONS

Figure 2 shows the evolution of markups in U.S. public firms from 1950 up to very recent years. Markups increased from being around 1.1-1.3 in the beginning of the sample to almost 1.7 in the end of the sample.

Figure 2: The Evolution of Average Markups (U.S. 1950-2014)

(De Loecker and Eeckhout, 2017)

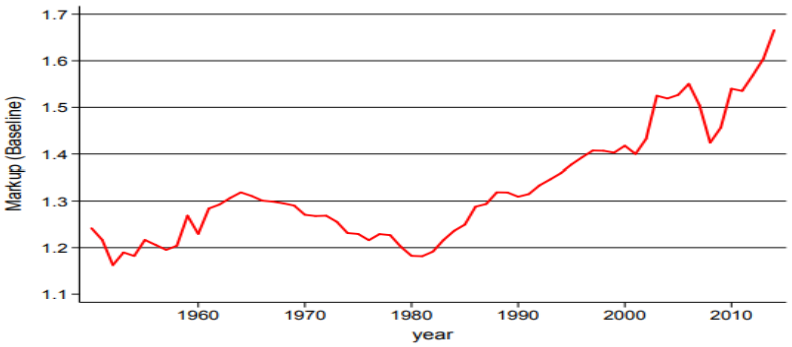


Figure 2 shows that in the beginning of the sample period markups were stable and slightly decreasing from 1.27 in the 1960 to 1.18 in 1980. Since 1980 there has been a steady increase to 1.67. In 2014, the average firm charges 67% over marginal cost, compared to 18% in 1980. (De Loecker and Eeckhout, 2017)

2.1 Markups across literature

Markup variability has always been a crucial topic of interest in empirical and theoretical literature. Literature tried to understand reasons behind markup movements, many theoretical and empirical studies have been implemented to investigate how markups respond to various stimulus. First we present the piece of theoretical literature that focused on the problem of markups variability: Rotemberg and Wood-

ford (1999) discussed the extent to which observed fluctuations in aggregate economic activity depend upon such variations in average markups; Bils (1987) examines whether the output price responds to cyclical movements in the marginal cost; Rotemberg and Saloner (1986) try to understand the response of oligopolies to fluctuations in the demand for their product; Jaimovich and Floetotto (2008) discuss about interaction between firms' entry and exit decisions and variation in the degree of competition that can lead to endogenous procyclical movements in measured total factor productivity (TFP).

Second we present the piece of empirical literature that focused on the problem of markups variability: Nekarda and Ramey (2019) study how markups move in response to positive monetary shocks and to government spending shocks; Anderson et al. (2018) provide direct evidence on the behaviour markups in the retail sector across space and time; Kim (2018) studies how a credit crunch affects output price dynamics; Ravn et al. (2004) study an environment in which agents form habits over individual varieties of goods as opposed to over a composite consumption good, called "deep habit formation model". They analyse the relation between deep habits and markups.

Rotemberg and Woodford (1999), Bils (1987), Rotemberg and Saloner (1986), Jaimovich and Floetotto (2008), Ravn et al. (2004) discovered a countercyclical movement in markups, while Nekarda and Ramey (2019), Anderson et al. (2018) and Kim (2018) provide evidence in favour of procyclical markups.

Third we present a study on the welfare costs of markups in a dynamic model with heterogeneous firms and endogenously variable markups (Edmond et al., 2018). Edmond et al. (2018) find that the aggregate markup accounts for about two-thirds of the costs, misallocation accounts for about one-third, and the costs due to inefficient entry are negligible. They also evaluate simple policies aimed at reducing the costs of markups: subsidizing entry is not effective while size-dependent policies aimed at reducing concentration can reduce the aggregate markup but have the side effect of greatly increasing misallocation and reducing aggregate productivity.

A fundamental concept must be borne in mind while we go through markup variation literature: the theory of New Keynesian models. Neoclassical models assume competition in both output and labour market. New Keynesian models, instead, relax this assumption about competition. The New Keynesian strand of macroeconomics introduces market power in product market and makes the level of the market power depend on the state of the economy. If an expansion of output occurs, for example due to government purchase, the economy becomes more competitive, implying a lower markup of price over marginal cost. New Keynesian models take the product price as sticky, thus while the boom raises input costs, prices stay constant, leading to a decline in the markup ratio: the margin of price over marginal cost falls during an expansion, in other words, countercyclical markups.

2.2 Theoretical papers

2.2.1 Variations in average markup influencing fluctuations in aggregate economic activity

If real marginal cost schedule does not change, variations in aggregate output can befall if and only if the markup of price over marginal cost varies. In this perspective, Rotemberg and Woodford (1999) discuss about the grade of influence of variations in average markup on observed fluctuations in the aggregate economic activity. They investigate the role of variations in the relation between prices and marginal costs in accounting for observed fluctuations in economic activity and employment. First of all, the paper analyses variations in markup over the business cycle. It is difficult to identify a measure of marginal cost and at the same time how should be measured cyclical variations in real marginal cost. A lot of considerations can be made and several of this provide evidence that real marginal costs are procyclical and hence that markups are countercyclical in the typical sector. This would mean that markup variation play a role in causing or amplifying cyclical fluctuations in economic activity. Rotemberg and Woodford (1999) start an excursus of different measures of marginal costs.

Cyclical behaviour of the labour share. In literature one of the mostly used measures of marginal cost is the cost of increasing output through an increase in labour input, holding fixed other inputs. If output is a differentiable function of the labour input and firms are wage takers, the marginal cost is the wage divided by the marginal product of labour. Assuming this aggregate production function

$$Y = F(K, zH) \tag{1}$$

where K is the capital stock, H, the number of hours worked and z an index of labour augmenting technical progress, then the expression of markups results:

$$\mu = \frac{PzF_H(K, zH)}{W} \tag{2}$$

the equation becomes a way to measure markup (or marginal cost) variations, it also points out two reasons for real marginal cost schedule to be upward sloping. First, constant other elements of labour supply, the real wage must rise to induce more people to work. Second, under the assumption that the production function F is concave and capital stock and the state of technology are fixed, the marginal product F_H is a decreasing function of labour input. It is not so clear if typical increases in employment are in fact associated with markup declines, it is important to take into account associated increases in K or z or decreases in the real wage $\frac{W}{P}$, sufficient to offset the effects of the increase in labour input on F_H. Real wages in general are procyclical, once one corrects for cyclical variation in the composition of the workforce. In alternative, real wages are procyclical because fluctuations in activity are caused

by variations in technical progress. Correcting variations in the rate of technical progress means that variations in the labour input and in the quantity produced need to be measured. To compute the calculation authors follow Bils (1987) and specialize the production function:

$$Y = g(K)(zH)^{\alpha} \tag{3}$$

where g is a positive increasing function and $\alpha > 0$. Marginal cost is then $\frac{WH}{\alpha Y}$, so that the markup is given by:

$$\mu = \alpha s_H^{-1} \tag{4}$$

where s_H is the labour share $\frac{WH}{PY}$. These assumptions lead to consider markup variations as the inverse of variations observed in the labour share. First they consider the evidence regarding cyclical variations in this simple measure. P is the price firms receive for their products, the relevant labour share becomes the ratio of labour compensation to the revenue received by firms which equals the value of output minus indirect taxes. Different measures of labour shares are considered: for the economy as a whole, for the corporate sector and for the nonfinancial corporate sector. The first measure is less appealing than others because it includes government and many of whose services are not sold in the market, moreover it contains in the denominator the income of proprietors, which is an element of compensation too. The three series are shown for the periods 1947:1 to 1993:1, together with the Hodrick-Prescott trend in labour share for the non financial corporate sector. The whole economy series breaks from the other two in 1960, and since it can be considered as a structural break in series and not an example of business cycle variation in the series, it is considered a sample after 1970 in analysing the cyclical behaviour of the series.
Rotemberg and Woodford (1999) show the correlation between the three measures of the labour share with various cyclical indicators: first is shown the correlation with predicted declines in output over 12 quarters considered in Rotemberg and Woodford (1996b), second with the predicted the Hodirck-Prescott filtered level of output, third, linearly detrended hours, while the last uses the hours series detrended using HP filter. All correlations are small and negative—except for the linearly detrended hours (small and positive)—suggesting feeble countercyclical movements in the labour share, while correlations with lags seems to be positive, meaning that a hight level of activity is associated with a subsequent increase in labour share. Correlations of labour shares with the leads of the cyclical indicators result uniformly negative, suggesting that the labour share peaks before the peak in hours.

Corrections to the labour share measure of real marginal cost. Labour share represents a valid measure of markup variation only under peculiar assumptions, Rotemberg and Woodford (1999) present some corrections. In the previous section may be underestimated the degree to which cyclical variations in output and employment are due to markup variations as opposed to shifts in the real marginal cost

schedule.

The first kind of correction would be that the production function is not necessarily a Cobb-Douglas, but a more general one, so the markup function becomes more generally:

$$\mu = \eta_H s_H^{-1} \tag{5}$$

where η_H is the elasticity of output with respect to the effective labour input $\eta_H = \frac{zHF_H(K,zH)}{F(K,zH)}$, the equation 5 turns into 4 when the elasticity is constant. Equation 5 has a potential new source of variation in the variable elasticity, which relates to the nature of cyclical variation in the elasticity of output with respect to the labour input. When F has constant returns to scale, the elasticity can be written as a function of labour to capital ratio, zH/K, or equivalently as a function of the output to capital ratio:

$$\eta_H = \eta_H(y) \tag{6}$$

where $y = Y/K$. In the case the elasticity of substitution between capital and labour input is less than one, the function 6 is monotonically decreasing. This moves away from Cobb Douglas case (a constant elasticity of substitution equal one), but Cobb Douglas usually represents long run substitution opportunities, whereas short run factor substitutability might well be less (maybe because we have a putty-clay technology). Since capital stock evolves slowly relative to the magnitude of business cycle fluctuations, and y is a procyclical variable, the elasticity in equation 5 adds additional countercyclical variation to the markup series. This kind of correction leads to the conclusion that markups fall more in booms than what suggested by the simple measure of labour share and that the markup decline coincide more closely in time with increase in output and hours.

The second correction implies allowing for the presence of overhead labour, this correction provides a further reason to regard markups as more countercyclical than is indicated by labour share alone.

The third correction is based on the fact that till now firms have been assumed to have a wage-taking behaviour, meaning that they can hire additional hours of work at the margin at the same price they pay for each of the hours that they do hire, so that the relevant marginal wage is equal to the average wage paid. The correction may consist in considering the firm's wage bill as increasing in H, but not necessarily linearly. The markup becomes:

$$\mu = \omega^{-1} \eta_H s_H^{-1} \tag{7}$$

where ω is the ratio of marginal wage and average wage, which can also be considered as one plus the inverse of the elasticity of firm-specific labour supply curve. Under the assumption that the elasticity of labour supply decreases as hours hired by the firm increases (it is hard to induce people to work after a certain time of hours, no matter the compensation), the ratio between marginal wage and average wage

would be an increasing function of H, implying that real marginal costs would be more pocyclical (and markups more countercyclical) than suggested considering the simple measure of labour share and also in 5.

Alternatively, you can imagine that a firm first hires a certain number of employees, then contracts with them about a wage schedule, which determines wage as function of hours worked. Then, after receiving information about demand conditions, firms determine the hours of work. If the number of employees is chosen ex ante, the firm would choose the number of hours to minimize the average wage, H^*, at this point the average wage is equal to the marginal wage and in case of small fluctuations in H around the minimizing value, H^*, the ratio of marginal wage to average wage should be increasing in H, implying more countercyclical markups than before 5.

The fourth correction may be taking into account the cost of adjust labour input. This correction would lead always to more countercyclical markups. This correction would make the implied markup series more negatively correlated with lead hours but less negatively with lags of hours.

The fifth correction is the labour hoarding, suppose that not all employees on a firm's payroll are used to produce current output at each point in time, this would imply more countercyclical markups than equation 5.

The sixth correction deals with the fact that is argued that the degree of utilization of firm's capital stock is porcyclical and that the production function is a properly function of "effective" capital inputs that do not coincide with the effective firm's capital stocks. If by this it is meant that a firm can produce more from given machines when more labour is used along with them, then it is not clear that "variable utilization" means anything not already reflected in the usual production function. For the sixth correction you have to suppose that it is possible for a firm to vary the degree of utilization of its capital stock other than by simply increasing its labour to capital ratio and that the production function contains the measure of the degree of utilization of capital stock u_K.

Summing up, there are a lot of reasons why the simple ratio price to unit labour cost is likely to measure imprecisely cyclical variations in markups. In general, corrections applied to this ratio stretch to make implied markups more countercyclical than in that simple measure.

Thus far Rotemberg and Woodford (1999) have discussed the overall pattern of cyclical fluctuations in markups. Now they want to investigate the degree to which markup variations play a role in the observed response of the economy to particular categories of aggregate shocks. Rotemberg and Woodford (1999) focus on shocks that can be identified in the data and are known as non-technological in character and presumptively statistically independent of the variations in the rate of technical progress. Considering these cases helps to exclude the hypothesis of shifts in supply costs due to changes in technology as

an explanation for the observed response of output and employment. This allows to judge the nature of markup variations in response to such shocks that are less dependent, under special assumptions, from the form of the production function. In particular, in the case of a variation in economic activity as a result of a non-technological disturbance, if markup does not vary, then real wages should move countercyclically. In the basic model this is an implication, under the assumption of diminishing marginal product of labour. In the basic model, in the short run, the capital stock is predetermined and increases in output can happen only for increases in hours worked, this implies a decrease of the marginal product of labour and, at the same time, a decrease in real wages. In the case of such a shock, the absence of countercyclical real wages movement is itself evidence of countercyclical markup variation. Procyclical or acyclical real wages in response to these shocks, implying countercyclical markups, are robust to different extensions of the simple model (presence of overhead labour, labour hoarding, utilization of the capital stock).
Rotemberg and Woodford (1999) then focus on the issue of whether expansions in economic activity associated with non technological disturbances are accompanied by declines in real wages. Three examples are often used in literature for identify non-technological disturbances:

- variations in military purchases: after the WWII has exhibited big variation, the causes of these variations are known as being connected with political events and have no obvious connection with technical progress;

- variations in the world oil price: this price has been far from stability, an extreme example is the oil price shock in 1970;

- monetary policy shocks identified using "structural VAR" methods: in this case is not easy to identify a time series for exogenous disturbances–since the Federal funds rate obviously respond to changes in economic conditions including real activity and employment, as a result of the kind of policies implemented by the Federal Reserve–but literature addressed this identification issue and Rotemberg and Woodford (1999) consider the estimated responses to these identified disturbances.

In each of these three cases, the variable of interest is associated with variations in real economic activity and these effects are consistent with economic theory, meaning that may be considered causal relationships. Several studies have addressed this issue. Rotemberg and Woodford (1992) show that an increase in real military purchases rise private value added hours worked in private establishments and wage, deflated by the relevant value added deflator. Ramey and Shapiro (1998) show that the effect on this real wage is different when revised NIPA data are used and that, with revised data, this real wage actually falls slightly. Christiano et al. (1997) show, using a structural VAR model to identify monetary policy shocks, that output and real wages both decline in response to the increases in interest rates that are associated

with monetary tightening. This again suggests that a contraction in output is associated with an increase in markup. Rotemberg and Woodford (1996a) analysed the response of U.S. economy to oil price increases, showing that during the pre-1980 OPEC period, such increase lowered both private value added and real wages. This combination of responses suggests that markup increase, especially during the second year following the shock.

Rotemberg and Woodford (1999) also try to investigate whether markups are more coutercyclical in industries where it is more plausible a priori that competition is imperfect. Rotemberg and Woodford (1999) show that sectors with more imperfect competition tend to have more countercyclical markups.

In the subsequent part of the paper Rotemberg and Woodford (1999) study to what extend markups fluctuations have a role in explaining business fluctuations. First Rotemberg and Woodford (1999) take two aspects of the observed cyclical variation in the relation between input costs and the value added of output that are sometimes taken to provide a first evidence for the importance of cost shifts (as opposed to markup changes) as the source of fluctuations in activity. These are the well known procyclical variations in productivity and profits. Rotemberg and Woodford (1999) result is that these procyclical variations contain very little information on the importance of markup changes because markup variation induce such procyclical responses. The following attempt by Rotemberg and Woodford (1999) is to measure the role of markup fluctuations in inducing cyclical fluctuations in economic activity. Any change in output that differs from that which is being induced by changes in markups ought naturally to be viewed as being due to a shift in real marginal costs (for a given level of output). This approach allows to disentangle output changes into that due to markup changes and those due to shifts in the marginal cost curve. This decomposition is revealing, because under the hypothesis of constant markups, all output fluctuations are due to shifts in real marginal costs.

Rotemberg and Woodford (1999) now review theoretical models on markup variation. Bigger emphasis is given to models in which markups vary endogenously, so affect the way economy responds to shocks. Different shocks are analysed, shocks that shift the marginal cost schedule ad other shocks that would not affect equilibrium output in the absence of an effect on equilibrium markups. Before discussing about models, Rotemberg and Woodford (1999) focus on the theoretical relations between markups and other variable of interest. It is worthy to note that an explanation for countercyclical markups need not to depend upon a theory that predicts that desired markups should be a decreasing function of the level of economic activity. If the real marginal cost schedule $c(Y)$ is upward-sloping, then any source of variations in the markup that is independent of variations in the marginal cost schedule itself will result in inverse variations in the level of output, so a negative correlation between markup and economic activity. Care is required in relating theory of pricing by a particular firm or industry, as a function of conditions specific

to that firm or industry, to their implications for aggregate output determination. A theory for which firm's markup is an increasing function of output may be considered a theory of procyclical markups, but in a symmetric equilibrium, in which all firms price according to this rule, relative prices and output never vary, and there will be no cyclical variations in markup at all. If, instead, not all firms continuously adjust their prices, the fact that adjusting firms determine their desired markup in this way can reduce the speed of overall price adjustment; and this increase in price stickiness can increase in the size of the countercyclical markup variations caused by disturbances such as changes in monetary policy.

The models presented are of two classes. The first model is such that firms are unable to charge the price (markup) that they would like to change because prices are sticky in nominal terms. Then, monetary shocks result to be the prime source of discrepancies between the prices firms charge and the price they would like to charge. This leads to changes in markup that change output even if desired markups do not change.

In the second class of models, real factors determine variation in desired markups, even in the case of complete price flexibility.

In conclusion, the leading advantage for markup variation is the awareness that it enlarges the range of types of disturbances that can affect aggregate economic activity. The absence of variations in markups would imply that output can just rise if real marginal cost falls, for example due to a change in effective labour supply of firms or as a result of technological progress. The presence of variable markups makes that monetary and fiscal shocks can have effects other than those resulting from changes in real wages at which workers are willing to work. The analysis of marginal cost cyclicality brings to the result that for reasons like overhead labour cost and adjustment cost, marginal labour cost should appear more procyclical. They also show that the observed procyclical variation in productivity and profits are consistent with the hypothesis that cyclical variations in output are primarily due to markup movements than changes in real marginal cost schedule do.

2.2.2 The failure of price to respond to cyclical movements in the marginal cost

Bils (1987) examines the cyclical behaviour of price/marginal cost margins, in U.S. manufacturing. First principles state that since prices move upward along the supply curve, demand shocks are partially smoothed in the short run. The short-run supply curve is strictly upward sloping because some factors are fixed with remaining factors subject to diminishing returns. Therefore short-run marginal cost is increasing in output. This is true for aggregate demand shocks too. A high level of demand should be associated with a general rise in the real price of outputs, real is meant relative to input prices and real interest rate. According to the classical economist's view of Macroeconomy as self-calibrating, the

mentioned price movements should partially stabilize cyclical movements arising from demand shocks. Moreover, in the classical theory there is the belief that prices respond quickly to variations in their demands (wage flexibility). In the General Theory, Keynes (1936) did not support the view for which input prices respond quickly to variations in their demand, leading to flexible wage view, instead supported the classical view that prices move procyclically relative to wages (countercyclical real wages). But, the findings of empirical literature seem to support procyclical real wages, one reason may be that the cycle largely reflects aggregate supply shocks, so the marginal cost will be countercyclical and real wages procyclical as consequence of procyclical productivity or procyclical inputs supplied. This paper examines the cyclical behaviour of price/marginal cost margins, it investigates movements of short-run marginal costs and, if they are procyclical, it examines whether the output price responds to cyclical movements in the marginal cost. The paper studies short-run marginal cost in a contest in which employment is quasi-fixed. Bils (1987) discovered that a short run increase in production-worker employment was associated with an increase in marginal cost and a negative movement in output price. The main cause of the rise in marginal cost is overtime payments, incurred because of not perfectly flexible employment. The sum of these results brings to the conclusion that price/marginal cost margins decrease for an expansion of production.

To compute the marginal cost, which is the real challenge in this setting, cost minimization requires the equivalence of the relative marginal products of inputs and of their relative marginal costs.

When inputs are chosen minimizing costs, the marginal cost of increasing output can be computed as the cost of increase input i to produce the marginal increase in output. The paper is focused on the varying average hours of work for production-workers, while keeping employment of production-workers and all other input fixed at their optimal levels. Bils assumes a less restrictive form to the production technology, less restrictive than Cobb Douglas: $Y = H^{\alpha} f(everything\ but\ h)$. Bils does not follow the standard macroeconomic approach that sets the marginal cost of an hour of labour equal to the wage rate W and the cost of increasing average hours to employment, N, times the wage rate. Bils takes this decision because it might happen that if firms must compete for labour, the compensation must reflect the higher disutility of higher hours worked, then Bils considers the effective cost of an hour of labour, W, as being a function of the number of hours worked, $W(H)$. Marginal cost of output then becomes:

$$MC = \frac{1}{\alpha}\frac{H^*}{Y^*}\left[W(H^*)N^* + W'(H^*)N^*H^*\right] = \frac{1}{\alpha}\left(\frac{N^*H^*}{Y^*}\right)\tilde{W}(H^*) \tag{8}$$

where

$$\tilde{W}(H^*) = W(H^*) + W'(H^*)H^* \tag{9}$$

$\tilde{W}(H^*)$ is interpreted as the "marginal wage schedule". To compute marginal cost, is clearly important the marginal wage. Since the marginal wage schedule is increasing in H, if hours are procyclical it is an

important component in marginal cost. Average wage rates over the cycle will be affected by procyclical movements of overtime hours, the effect is small, because an average wage rate divides the over-time premium by all hours worked. Bils (1987) found that through an overtime premium a small increase in average hours per week raises marginal wage more than average wage. In previous studies was used average cost as proxy of marginal cost, this explains why compared to these studies Bils (1987) finds that marginal cost is much more procyclical and markups much more countercyclical. Since marginal wage is increasing in hours it would be reasonable for firms to vary labour inputs by varying employment, but employment is not perfectly flexible. If varying employment is costly for firms, it will be optimal for them to incur in some costs of having hours away from their optimal long-run value. Quasi-fixed employment is captured through a convex function (typically quadratic) of change in employment in the firm's overall cost or profit function. Talking about labour it can be considered that the convex function of change in employment can be interpreted as proxy of the firms preference for a steady level of employment. Variations in employment are costly for a lot of reasons: the process of hiring/firing is costly; a decrease in employment leads skilled workers to leave, their skill depreciate, thus, when employment increases, additional training is required. Equation 8 is expression of the cost of marginally increasing average hours holding other inputs, including employment, at their cost-minimizing value. But, marginal cost can be alternatively seen as the cost of marginally increasing employment holding other inputs, including average hours, at their cost-minimizing values. Marginal adjustment cost of increasing employment is going to be a component of this marginal cost, given that employment is quasi-fixed. The result will be that marginal cost is high when employment (not hours) is relatively high.

In the calculation of marginal cost in equation 8 there is a constant parameter α, $\frac{NH}{Y}$ is given by data, therefore, the problem of estimating cyclical movements in marginal cost reduces to estimating the shape of the marginal wage schedule, $\tilde{W}(H)$, which is the main purpose of this paper. If you allow for overtime premium, the firm faces this effective wage:

$$W(H) = w\left[1 + p\frac{V}{H}\right] \tag{10}$$

where, w is the straight-time wage, p is the overtime premium and V is the average number of hours per production workers. The marginal wage with respect to hours is

$$W(H) = w\left[1 + p\left(\frac{dV}{dH}\right)\right] \tag{11}$$

for the manufacturing industry, law says that an overtime premium has to be paid after 40 hours of work, thus, if all workers work the same number of hours, the average number of overtime hours would be: $V = H - 40$, the change in overtime hours for a change in hours, would be 0 if H is less than 40 and 1 when H is greater than 40. The implied marginal wage is very procycical as hours typically move

from below to above 40 when there is an expansion. The assumption that all workers work the same number of hours is not very realistic, thus Bils (1987) assumes that there is some variance in hours across workers, this implies that: overtime hours are a smooth function of average hours. It remains that the change in overtime hours for a change in hours is increasing in H, thus being procyclical as well as the marginal wage. When the condition that average hours are low occurs, they can increase without an increase in overtime hours, but when H is already high it might be necessary to have an overtime hours increase, because everyone would work 40 or more hours per week. This implies a marginal wage that is continuously increasing in average hours, rather than jumping at 40 hours per week. Firm's overtime hours per worker can be written as a function of the firm's average hours per worker and the higher moments of the distribution of hours across workers, Z.

$$V = f(H, Z) \tag{12}$$

Big focus must be posed on the derivative of overtime hours with respect to average hours, it contains: a parameter expressing an increase in overtime hours for an increase in hours when these are around 40 per week, which should be equal to 0.5 if hours are symmetric around H; a parameter which describes how rapidly the derivative of overtime hours rises (or how steep marginal wage is), with respect to hours at H equal to 40 per week. Bils (1987) considers in the estimation the possibility that both parameters vary across industries and with time trends. On one hand, as H goes to zero, no one will be working 40 hours per week and the derivative of overtime hours with respect to average hours should be zero. On the other hand, as H increases, everyone will be working overtime and the derivative of overtime hour with respect to average hours should approach one. Bils (1987) tries to capture this nonlinear relationship with two more non-linear trends. The marginal wage schedule changes including the new form of the derivative of overtime hours with respect to average hours. At this point a problem arises, the parameter that expresses the overtime premium is treated by Bils (1987) as a parameter to be determined, but, according to law, the premium has to be 50 percent, the issue is that might be not correct to consider the effective premium for overtime hours equal to the rate of 50 % firms must pay by law. If there is a long-term relationship between employer and employees, the effective wage rate cannot be equal to the wage payment made at any single point in time. For example, if a firm pays its workers more than the marginal disutility of labour in one period, in the following period the firm is likely to pay less than the marginal disutility of labour. Overtime payments consequence is that the wage paid by a firm jumps of 50 % at 40 hours per week, while worker's disutility is smoothly increasing in hours of work. "This implies workers would strictly prefer working some overtime hours to working 40 hours per week (in fact, overtime hours are rationed in many instances). By offering workers overtime hours, therefore, a firm may incur some goodwill, which allows it to lower compensation in another form, if not then, at some other time.

The implication is that the effective cost premium of an overtime hour may be less than the 50 percent explicit payment." When overtime hours become sufficiently high, workers will presumably disapprove any increase in hours, despite the overtime pay. At this point it is reasonable to think that the effective premium would exceed 50 percent. Two separate approaches are used for estimating the marginal wage. The first estimates the effect of change in hours on overtime hours directly. To arrive at a marginal wage, the effective overtime premium is presumed to be 50 percent.

The second approach infers the shape of marginal wage schedule from observing the cost-minimizing choice firms make for employment and average hours. Different things are needed to estimate the absolute value of marginal cost and the relative cyclical movements in the marginal cost: first is necessary to know the absolute value of the marginal wage schedule; second is sufficient to know the shape of the marginal wage schedule. A firm to minimize its overall cost function or to maximize profits, must choose employment and average hours to minimize the cost of its desired quantity of production labour. The problem becomes more general than profit maximization or cost minimization. Bils (1987) considers employment to be quasi fixed, so it considers the firm's dynamic problem of minimizing the expected present-discounted value of the costs of procuring its expected future stream of production-labour demands. This approach simultaneously estimates the effect of hours on overtime hours and the overtime premium. Therefore, it is not necessary to presume that the effective overtime premium equals 50 percent; thus the second approach is much less subject to the criticism just raised. The result is that the two approaches give fairly similar estimates for the shape of the marginal wage. This supports an assumption that the effective overtime premium is near 50 percent.

Given an estimate for the marginal wage, it is easy to compute marginal cost. Marginal cost has three components of interest: the straight-time wage, movements along the marginal wage schedule, and a term for productivity. Through the estimates of the relationship between hours and overtime hours directly, can be computed the price/marginal cost markup.

Bils (1987) examines the cyclical behaviour of markups regressing each component of the markup on a measure of the business cycle; results show countercyclical markups (a 10% short-run increase in employment is associated with a 0.4% decrease in markup), a slightly countercyclical productivity, very procyclical marginal costs, and procyclical nominal marginal cost. Much of the procyclical movement in nominal marginal cost originates from the impact of average hours on the marginal wage.

During booms firms must incur in "adjustment costs" if they increase employment, or considerable overtime pay if they expand hours per worker. In conclusion, from the paper we realise that prices did not respond to the cyclical movement in marginal cost, thus markups resulted to be countercyclical. Markups over marginal cost decline by 3.3% with a 10% expansion. The finding of a very countercyclical markup

is robust across most of the industries. This evidence is clearly inconsistent with a perfectly competitive view of manufacturing. It is also inconsistent with the view that wage stickiness is an important cause of the business cycle. So, even if wage schedules do not respond to business cycle movements, there is much cyclical variation in the marginal cost of labour due to variation in average hours, meaning that imperfections in goods markets play a primary role in the cycle. The paper result is that in most industries, output price fails to respond to the cyclical movement in marginal cost, so price/marginal cost margins are markedly countercyclical. The results of this paper contradict business cycle theories that attributes the causes of low production in a recession to a high real cost of producing; Bils (1987) supports, instead, theories that attribute the causes of low production in a recession to the inability of firms to sell their output.

2.2.3 Price wars in oligopolies dynamics during booms

Rotemberg and Saloner (1986) try to understand the response of oligopolies to movements in the demand for their product. Their result is that oligopolies that implicitly collude are likely to behave more competitively in periods of high demand; they show that oligopolistic industries have relatively low prices in these periods. They argue that the few price wars documented seem to have taken place in periods of high demand. In the end they study the macroeconomic consequences of this behaviour. They show that it is possible that if occurs a shift in the demand towards good produced by oligopolies there should be an increase in competitiveness that may be sufficient to raise the output of all sectors. They studied implicitly colluding oligopolies by Friedman (1971), in this contest firms obtain profits bigger than the competitive profits through the threat of switching to competitive behaviour whenever a single firm deviates from cooperation. This threat is sufficient to guarantee cooperation by all firms. Rotemberg and Saloner (1986) claim that oligopolies find this kind of implicit collusion more difficult to implement when there is a period of relatively high demand.

The reason that explains this difficulty is that when a period of high demand occurs, the price is a strategic variable and the firm that undercuts the price, chosen to maximize joint profits, gets to a large benefit. One one hand, a firm that undercuts the mentioned price, manages to capture a larger market until the others are able to adapt their prices. On the other hand, the punishment from deviating is less influenced by the actual state of demand, since punishment will occur in the future and demand is going back to its normal level.

So, the benefit from deviating from the output that maximizes joint profits is going to be bigger than the punishment under periods of high demand.

Rotemberg and Saloner (1986) explain that industrial organization literature provides a wide range of

studies intended to measure cyclical variations in price-cost margins, computed by most researchers as sales minus payroll and material costs divided by sales.

According to Rotemberg and Saloner (1986) this is a raw, but easy, approximation of the Lerner Index. Their concern is that price-cost margins can only be interpreted as the Lerner Index if labour costs are proportional to output. However, the fixed component to labour cost is large, thus when output raises the ratio of labour cost to revenue falls and *ceteris paribus*, price-cost margins rise. So if labour fixed cost is higher in concentrated industries, the expectation should be of relatively procyclical price-cost margins. Rotemberg and Saloner (1986), following Burda (1994), studied some independent evidence on margins, they report correlations between real product wages and employment. Real product wages are the ratio between the average hourly wage paid by the industry and the value added deflator for the industry, real wages can be interpreted as different raw measure of marginal cost over prices. The implicit drawback of this measure with respect to traditional price-cost margins is that interpreting them this way requires both materials to be proportional to output and that material costs are simply passed through. The benefit, instead, is that they remain valid when some of the payroll expenditure is a fixed cost as long as the margins, labour has a constant marginal product. It turns out that if the marginal product of labour actually falls as employment rises, more evidence is in support of Rotemberg and Saloner (1986) theory.

According to Rotemberg and Saloner (1986) concentration index is not a perfect measure to understand if a firm is an oligopoly or not, nonetheless higher concentration indices can be signal of a smaller number of important sellers. Indeed, printing concentration index is low even though its large components are newspapers, books, and magazines that are in fact highly concentrated, if location in space or type is considered. Glass results without doubt a more oligopolistic industry than shoes. So Rotemberg and Saloner (1986) classify the sample into relatively not concentrated and relatively concentrated and choose, arbitrarily, as cutting line the median concentration of 35.4, this latter lies between food and nonelectrical machinery. Rotemberg and Saloner (1986) test on whether concentrated and unconcentrated industries have the same ratio of positive correlations to negative ones against the alternative that this ratio is significantly higher for concentrated industries. The χ^2 test of independence just focuses on the main hypothesis of independence, without focusing on the alternative. It rejects the hypothesis of independence with 97 percent confidence. The Fisher test would be more suitable for the small sample considered; it is an exact test against the alternative that more concentrated sectors have more positive correlations between real wages and employment. With this test the hypothesis that the ratio of positive correlations is the same can be rejected with 96 percent confidence. Standard labour demand theory is against these findings, in this theory employment rises just when real product wage decreases. This happens in both monopolistic and competitive industry when there are diminishing return to labour. Therefore, the find-

ing that product wage rises when employment rises, supports the widespread price cutting implied by the theory of Rotemberg and Saloner (1986). Technological shocks give an alternative classical explanation for their findings. Shocks can increase or decrease the demand for labour by a particular sector. If shocks increase the demand and the sector faces an upward-sloping labour supply function, employment and real wages can both increase. The main problem is that sectors with positive correlation are not usually sectors which experience many technological shocks of this type. In particular, stone, clay and glass, printing and publishing and rubber have stagnant technologies. While, instruments and chemicals may be sectors among which there is a fast change in technology.

Studies from Bresnahan (1987) and Porter (1983) show that some industries alternate between cooperative and noncooperative behaviour. Instead, Rotemberg and Saloner (1986) finding was in sum that competitive behaviour is observed only during booms. Rotemberg and Saloner (1986) at this point switch from studying the behaviour of oligopoly in isolation to study the aggregate consequences, modelling the rest of the economy.

Rotemberg and Saloner (1986) model. Rotemberg and Saloner (1986) consider a two-sector general equilibrium model, where the first sector is competitive and the second is oligopolistic. The labour market is competitive; workers have a horizontal supply of labour at wage equal the price of the competitive good. Since the model is homogeneous of degree zero in prices , both the wage and the price of the good produced competitively can be normalized to one. The good produced competitively can be produced through various combination of good 2 and labour. The production function of good 1 is given by:

$$Q_{1t} = \alpha + Q_{21t} - \frac{\beta Q_{21t}^2}{2} + \gamma L_{1t} - \frac{\xi L_{1t}^2}{2} \tag{13}$$

where, Q_{1t} is the output of the competitive sector, Q_{2t} is the amount of good 2 employed in the production of good 1 at t and L_{1t} is the amount of labour used in the production of good 1. Since the sector is competitive the price of each factor and its marginal revenue product are equated. Thus,

$$L_{1t} = \frac{\gamma - 1}{\xi} \tag{14}$$

$$P_{2t} = \alpha - \beta Q_{21t} \tag{15}$$

on the other hand the demand for good 2 by consumer is given by

$$P_{2t} = n - mQ_{2ct} + e_t \tag{16}$$

where Q_{2ct} is the quantity of good 2 purchased by consumer, n and m are parameters, and e_t is an independent and identically distributed random variable. Therefore total demand for good 2 is given by

$$P_{2t} = a + \epsilon_t - bQ_{2t} \tag{17}$$

$$a = \frac{(n\beta + m\alpha)}{(m + \beta)} \tag{18}$$

$$\xi_t = \frac{e_t \beta}{(m + \beta)} \tag{19}$$

$$b = \frac{m\beta}{(m + \beta)} \tag{20}$$

assuming that labour requirement to produce Q_{2ct} leads to

$$L_{2t} = cQ_{2t} + \left(\frac{d}{2}\right) Q_{2t}^2 \tag{21}$$

which implies that marginal cost is $c + dQ_{2t}$. The model would be unaffected if good 1 where also an input into good 2 since the price of good one always equals the wage. If sector 2 behaved competitively, marginal cost would equal P_{2t}, then output and price of good 2 would be:

$$Q_{2t}^c = \frac{(a + \epsilon_t - c)}{(b + d)} \tag{22}$$

$$P_{2t}^c = \frac{((a + \epsilon_t)\, d + bc)}{(b + d)} \tag{23}$$

an increase in ϵ_t leads both to an increase in the competitive price and in the quantity of good 2. Less of good 2 will be used for the production of good 1, thus falls the output of good 1. This means that a change in taste raises the output of one good and lowers the other. Since people desire leisure, the economy results to have an implicit production possibility frontier. If sector 2 always behaves like a monopolist, similarly, an increase in ϵ_t raises both price and quantity of good 2, lowering the quantity of good 1. Again, shifts in the demand are unable to change the level of both outputs in the same direction. While, if the industry behaves like an oligopoly, an increase in ϵ_t can easily lead to a fall in the relative price of good 2. It occurs when the indefensibility of monopoly leads to competitive outcomes whether the strategic variable is price or output as long as increases in ϵ_t make monopoly harder to sustain. It also always occurs when the strategic variable is prices and the oligopoly plays an optimal supergame.

The decrease in P_{2t} in turns lead firms in the first sector to demand more of good 2 as an input and to increase their output. If increases demand for the oligopolistic good, all outputs raise as much as they move together during business cycle. Considerations have to be made. The assumption that real wage in terms of good one is constant is not important. In equilibrium, the reduction of the price of good 2 raises real wages inducing workers to work more even if they have an upward sloping supply schedule for labour.

It is unclear if the increased supply of labour would be able to cover the increased demand for employee by sector 2, if it was not, the wage would raise in terms of good 1. It is interesting to note that if the increased supply of labour was large, price of good 1 would have rise, implying raising employment also

in sector 1. This would lead to an expansion even if good 2 was not an input in good 1. The model can be easily adapted to be consistent with the procyclical variation of profits. Even though sector 2 reduces the margin between price and marginal cost ad output expands, the difference between revenues ad total costs can increase as long as there are fixed costs. The analysis does not explain the causes of shifts in sectoral demands, may be reasonable to relate these shifts in the demand to changes in the money supply and interest rates which are highly correlated with cyclical fluctuations. The model presented shows some Keynesian features, first of all shifts in the demand are related to fluctuations in the demand, while in classical models are related to change in supply conditions such as productivity or labour supply. The model has the potential to provide an explanation for the stickiness of prices.

Supposing an increase in ϵ_t is correlated with an increase in money supply, then increases in output are correlated with increases in money supply. As long as increases in output raises demand for real money balances, increases in the money supply will be correlated with increases in the real money balances. In conclusion, prices do not raise equiproportionately. The multiplier can also be discussed in this context: increases in demand lead output to raise which then leads to further increases in demand. Here an increase in demand in an oligopolistic sector can raise that sector's output, lower its prices and consequently raise national income. In turn, this increased national income can lead to increases in the demand for other goods produced in other oligopolistic markets, thus lowering their prices and raising their output as well. In the paper they only consider business cycles that are due to the tendency of oligopolists to act more competitively when demand shifts towards their products. An alternative view is that business cycles are due to change in aggregate demand which do not get reflected in nominal wages. In that case, a decrease in aggregate demand raises real wages, reducing all outputs. They end up with an oligopoly model in which firms tend to collude more in these periods of low demand. The result is that recessions are bad because output is low and also because there are bigger distortions. The business cycles discussed in this paper does not imply necessarily stabilization policy, while in real business cycle models stabilization is a key point, in the model presented here may be injurious. Booms occur because, occasionally, demand shifts towards oligopolistic products. In these periods the incentive to deviate from collusion is bigger, because firms know that the punishment will be implemented in period of low demand. If instead, future demand were also known to be high, the threat of losing the monopoly profits in those good periods might be sufficient to induce the members of the oligopoly to collude now. So, if demand for the goods produced by oligopolies were stable they might collude always, leaving the economy in a permanent recession. Therefore the effects of stabilization policy ground crucially on whether these rigidities or nominal rigidities accompany business cycle fluctuations.

2.2.4 Changes in the number of firms leading to markup variations

One of the first target of Jaimovich and Floetotto (2008) in the paper named "Firm dynamics, markup variations, and the business cycle" is to address two issues raised from empirical evidence:

- considering that the aggregate number of competitors varies procyclically in the U.S. data, a concern might be that this aggregate result is driven by just a few industries;
- smaller firms typically make up the majority of entrants and exits, potentially implying that variations in their number are less important, if the entry rate is weighted for the firm size.

About the first issue Jaimovich and Floetotto (2008) use information about the number of failing firms around 1956 and 1996 to estimate the contemporaneous correlation between the number of failing firms for each of the industries included in the dataset and real GDP. Even if in different measures, all industries are characterized by countercyclical failure rates. This suggests that are characteristics of most U.S. industries at different aggregation levels. About the second empirical concern, it is important to note that variations in the number of firms is a driving force from the model's perspective, but it is not the unique factor that generates changes in the number of competitors. For example other elements that generate changes in the number competitors are changes in the number of establishment and franchises. This becomes evident from the positive and significant contemporaneous correlation between real GDP and both the number of establishment and of franchises. Jaimovich and Floetotto (2008) use data at establishment level from job-losses and gains for the period 1992-2005 from either respectively collected from closing or contracting establishments and from opening or expanding establishments. They report the estimates of gross job-gains (losses) is the U.S. explained by opening (closing) establishments and the fraction of the volatility in job-gains (losses) that is accounted for by the cyclical volatility of employment in opening (closing) establishments (respectively around 20 % and 30%). Thus, measures of competition are significantly affected by cyclical fluctuations in the number of establishments. Changes in the number of establishments or franchises are changes in aggregate data and thus will not be reflected in the data as changes in the number of firms. However, the model interprets entry as variation in the number of overall competitors, not just in the number of firms. These results should be taken with caution, given the level of aggregation, but a wide branch of empirical studies drives toward the same evidence of the existence of significant variations in the number of competitors at the business cycle frequency. About the economic environment and derivation of the model's equilibrium conditions, the model considers a representative agent that has preferences over random quantities of consumption and leisure. The agent maximizes his life-time utility (increasing in consumption and decreasing in labour), subject to the law of motion for capital. The characteristic of the economy is the presence of a continuum of sectors of measure one. In

each sector there is a finite number of intermediate firms that produce a differentiated good, these goods are imperfect substitutes in the production function of a sectoral good, which are imperfect substitutes for each other when aggregated into a final good. Entry and exit of intermediate producers are subject to the satisfaction of the zero profit condition in each period in each sector. The final good is produced with a constant returns to scale production function, which aggregates a continuum of measure one of sectoral goods. The elasticity of substitution between any two different sectoral good is constant. Producers of final good are competitive and the household uses the final good for consumption and investment. In each sector of the economy there is a positive number of firms bigger than 1 that produces differentiated goods that are aggregated into a sectoral good by a CES aggregating function, the number of sectors is a constant variable, while the number of firms can change with time. Each sector is characterized by monopolistic competition, each firm produces a quantity of a specific good and sets the price in order to maximize profits. The elasticity of substitution of two goods within a sector is higher than the elasticity of substitution across sectors. Each intermediate good in a sector is produced using capital and labour. The log of technology shocks follow a stationary first order auto-regressive process with persistence parameter θ lower than 1 and normally distributed innovation, ϵ, with zero mean and constant standard deviation. Moreover in the function of the intermediate good appears also overhead cost with the negative sign, their role is to reproduce in the model the apparent absence of pure profits in the U.S. despite the presence of market power. The final good producer solves a static optimization problem that results in the usual conditional demand for each sectoral good. Within each sector there is a finite number of operating firms, implying that each producer of the intermediate good does not affect general and sectoral price level. The result is that the price elasticity of demand faced by single firm is a function of the number of firms within a sector, thus an increase of the number of firms induces the producer of the intermediate good to face a more elastic demand curve. A solution to monopolistic firm's problem has to satisfy the condition marginal revenue equal marginal cost. The markup function is monotonically decreasing in the number of firms. As the economy's technology is symmetric with respect to all intermediate inputs, the paper focuses on symmetric equilibria. Finally, in the symmetric equilibrium, a zero-profit condition is imposed in every sector in every period. Each firm which produces its own differentiated product faces a downward sloping demand curve. The economy structure implies that an increase in the number of firms leads to an endogenous increase in the price elasticity of demand that each producer faces, implying that the size of the price reduction required for selling an additional unit is lower. This increases the marginal revenue productivity of the factors of production. To analyze the model's implication for the measurement of technology shocks: the measured TFP is comprised of two factors: a true exogenous technology shock and a new endogenous productivity measure, this endogenous component is the result

of interaction between net business formation and variation in the degree of competition. The endogenous effect influences TFP measure throw the fact that a positive technology shock influences marginal cost of production and generates new profit opportunities. This in turn leads to firm entry and takes place until the economy reaches the zero profit condition. The increase in the number of firms results in a markup fall. With a lower markup the oligopolistic producer has to sell higher quantities to recover fixed costs of operation, which includes the ratio of fixed costs to actual sales to decrease. Capital and labour are used for the production of actual sales and fixed components. A fall in the ratio above thus implies that a smaller share of resources is used for the production of the fixed cost component. A TFP is measured only in terms of the actual sales, this has the same observable implications as a true positive technology shock. Significant movements in the aggregate output over business cycle is attributable to variations in the measured TFP. In this contest everything implies that variations in the measured TFP are given by true exogenous technology shocks and true endogenous effects deriving from the interaction between number of operating firms and markup. The TFP variance results to be the variance of technology and the variance of markup minus the covariance between the same two terms. In order to analyze the variance-covariance decomposition the paper studies a time series of technology shocks, the model's equilibrium conditions are used to estimate an adjustment time series of technology residuals that is consistent with the model and allows for cyclical variations in markup. About the results it is shown that given the estimates of technology shocks, the variation of TFP can be decomposed and it is found that 43 % of the variation in the measured TFP can be attributed to endogenous mechanisms emphasized in this paper. These results suggest that the interaction between net business formation and variations in the degree of competition can provide an endogenous explanation for a significant share of variation in measured TFP. The RBC model does not incorporate a quantitatively important magnification mechanism. So, in order to account for the observed fluctuations in economic activity it must rely on exogenous technology shocks. The question is that if the interaction between the variation in the number of firms operating and the variation in the degree of competition can overcome this problem. Thus, even if it occurs a less volatile time series of technology shock, is the internal magnification mechanism so based on firm entry/exit model such that it is able to account for observed fluctuations in aggregate economic activity? To quantify the internal magnification mechanism the model economy is simulated using the adjusted time series estimated previously. Impulse response functions make clear the magnification effect: the response of measured TFP to a 1 % technology shock is a persistent and quantitatively significant deviation of 45 %; while the number of firms, after the same technology shock, shoots up, descending slowly to the steady state, since markups are negatively related to the number of firms they go below the steady state during the boom. The simulates entry/exit model generates output, consumption, investment volatilities that

are nearly identical to those generated by the RBC model, the key feature of entry/exit model is such that it generates significant output volatility from technology shocks that are far less volatile than those in RBC. The interaction between markups and variation in the number of firms endogenously magnify these shocks. The endogenous interaction between net business formation and markup variations accounts for almost half of the variation in measured TFP. Only small movements in markup are required to generate a powerful magnification mechanism for the entry/ext model. In the end the paper compares the statistical properties of TFP variations in U.S. data with those generated by the RCB model and the entry/exit model. Even if the volatility of technology shock is lower for the entry/exit model the endogenous variation in TFP are such that the two models generate an identical TFP process. In U.S. data, the standard deviation of TFP is about half the standard deviation of output. The entry/exit model and RBC model generate a ratio between standard deviation of TFP and standard deviation of output that is bigger than 0.5, thus bigger than what found in the data. In conclusion, the model presented by Jaimovich and Floetotto (2008) is such that net business formation is endogenously procyclical. They consider that the variation in the number of firms operating in the market brings to countercyclical variations in markups that lead to endogenous procyclical movements in measured TFP (Total Factor Productivity). On the basis of this result their paper suggests a decomposition from a structural point of view of TFP variations. The TFP variations will be decomposed in variations originated from exogenous shocks and variations originated endogenously from the interaction between firm's entry and exit decisions and the degree of competition (40% of the movement of TFP are attributed to this last term). So, it is important to highlight the reasons behind the procyclical movements in the measured TFP: the interaction between firm's entry and exit decisions and variation in the degree of competition. Again, the paper provides evidence that markups' cyclicality can be explained by an increase in competition due to firm-entry. When the demand for goods rises, new firms enter the market and compete by reducing prices. Jaimovich and Floetotto (2008) also investigate the effect on the measurement of the volatility of exogenous shocks in the U.S. economy and the magnification of shocks over the business cycle.

2.3 Empirical papers

2.3.1 Cyclical properties of markup: key transmission channel of shocks in new Keynesian models

Nekarda and Ramey (2019) aim is to test the foundation of New Keynesian models that find in countercyclical markups the key transmission channel for monetary and other "demand" shocks. To test these foundations, they study the cyclical properies of the markup of price over marginal cost.

Examples of the models that are tested in this paper are the Rotemberg and Woodford (1991) model and

Goodfriend and King (1997): the first one suggests that an increase in government spending leads to both an increase in hours and real wages, because imperfect competition generates a countercyclical markup; in the second model, under sticky prices and procyclical marginal costs, an expansionary monetary shock or a government spending lead to a depression of markups.

In the theoretical section Nekarda and Ramey (2019) take the original expression of theoretical markup, which is the ratio between the price of output and the nominal marginal cost of increasing output. In order to derive markups, Nekarda and Ramey (2019) consider the problem of a firm that has to choose hours per worker to minimize the total cost. The expression of marginal cost of increasing output by raising hours per worker becomes the ratio between the marginal cost of increasing average hours per worker and the marginal product of increasing hours per worker.

For the numerator Nekarda and Ramey (2019) argue that it is clear the difference between marginal and average cost, they have different cyclical properties, it would lead to cyclical bias using one instead of the other to compute markup. They use an adjustment for the marginal wage, they use the ratio of marginal wage and average wage to convert the observed average wage to the theoretically-correct marginal wage required to estimate the markup.

For the denominator of marginal cost of output, they found an estimate for the marginal product of labour, connected to the shape of the production function.

Nekarda and Ramey (2019) consider three cases and consequently three different markups:

- marginal wage equal to average wage and marginal product of labour proportional to average product (Cobb Douglas case);
- The estimate of the markup is the ratio of the average markup and the marginal-average wage adjustment factor;
- a more general case in which the production function has constant elasticity of substitution (CES).

Nekarda and Ramey (2019) study these three different measures of markup and how they respond to some stimulus. About the first measure of markup, computed considering marginal wage equal to average wage, they assess the cyclicality of the markups more systematically in three ways:

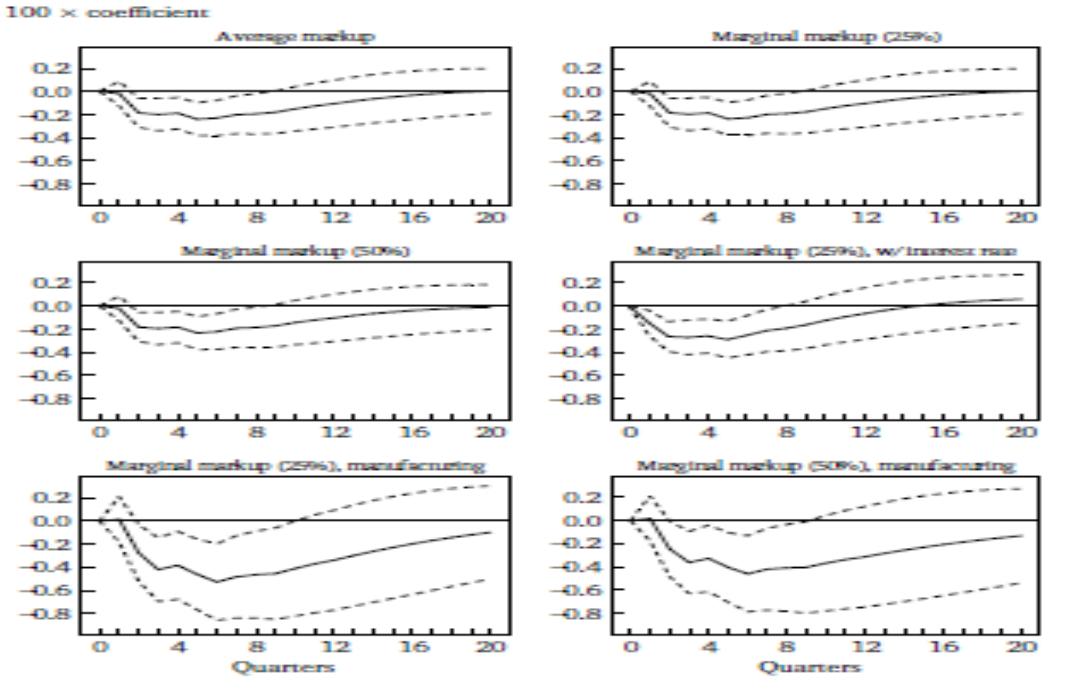
- they test whether the markups are indeed lower during recessions by regressing the log markup on a quadratic time trend and a dummy variable for recessions;
- as a second measure of cyclicality, they calculate the contemporaneous correlation between the cyclical components of the log of real GDP and the log of the markup, using an HP filter;
- finally, they study the contemporaneous correlation using a first-difference filter.

The results for the first case is that the markup is estimated to be significantly lower relative to trend during a recession. For the second and third case, the result is that the cyclical component of the markup is positively correlated with the cyclical component of GDP, whether is used an HP filter or take first differences. Thus, the average markup in all four broad sectoral aggregates is procyclical.
About the second measure of markup they assess the cyclicality of markups measured using marginal wages. The estimate of the markup is the ratio of the average markup and the marginal-average wage adjustment factor. They find that all measures of the markup remain procyclical or acyclical even after adjustment.
The third measure of the aggregate markup is based on the assumption that the production function has a lower elasticity of substitution between capital and labour than the Cobb-Douglas production function. This markup requires an estimate of the level of technology, as well as of the elasticity of substitution. Two methods of estimating technology level are considered. The first estimates technology as the HP trend in labour productivity. This method assumes that all business cycle variation in labour productivity is due to factors other than technology. The second uses Gali (1999)'s structural vector autoregression (VAR) method for identifying a technology shock as the only shock that has a permanent effect on labour productivity. To summarize results, they find that markups measured using average wages are procyclical in the aggregate economy and in manufacturing. The procyclicality of the markup in manufacturing remains even after adjustment.

In many New Keynesian models, such as those by Goodfriend and King (1997), Smets and Wouters (2007) and Smets and Wouters (2003) money is nonneutral because all prices do not adjust immediately. A contractionary monetary policy shock raises the markup because marginal cost falls more than price. Thus, the markup should move countercyclically if the business cycle is driven by monetary policy. However, because these models also imply that the markup increases in response to a technology shock, a procyclical markup does not, by itself, necessarily invalidate the models.
Nekarda and Ramey (2019) try to test the mechanism of these models directly, they show how the measure of markup they found respond to a monetary policy shock. To do this, they add the markup to a standard monetary VAR. The VAR consists of the log of real GDP, the log of commodity prices, the log of the GDP deflator, the log markup measure, and the federal funds rate. They include four lags of each variable and a linear time trend. Following standard practice, they identify the monetary policy shock as the shock to the federal funds rate when it is ordered last. They estimate the VAR using quarterly data over 1960:3-2009:4. They consider the average markup in private business and several measures of the marginal markup in the private business and manufacturing sectors, the impulse response of these

markups to a contractionary monetary shock, show that output falls and stays below trend for about four years. In every case the markup falls in response to a contractionary monetary shock, against New Keynesian theory. Furthermore, the responses are below zero at conventional significance levels.

Figure 3: Response of Markup to a Contractionary Monetary Policy Shock



Source: Authors' calculations using quarterly data for 1960:3–2009:4. Markup is inverse of labor share for private business from the NIPA; real GDP and GDP deflator are from the NIPA; commodity prices are from the BLS; federal funds rate and prime rate are from the Board of Governors of the Federal Reserve System.

Notes: Impulse responses estimated from VAR(4) with log real GDP, log commodity prices, log GDP deflator, markup measure, and federal funds rate; also includes a linear time trend. Monetary policy shock identified as shock to federal funds rate when ordered last. Specification with interest rate includes the prime rate in marginal cost. Dashed lines indicate 95-percent confidence interval.

Nekarda and Ramey (2019) make also an adjustment to take into account the fact that a contractionary monetary policy shock might raise firms' costs by raising interest rates. If firms must finance working capital, then an increase in interest rates raises their marginal cost. To include this effect, Nekarda and Ramey (2019) multiply the wage measure of marginal cost by the gross nominal interest rate. For this they use a quarterly average of the prime interest rate. Allowing for a cost channel does little to change the procyclicality of the markup.

After the monetary shock Nekarda and Ramey (2019) try to estimate how the markup responds to a change in output induced by shifts in demand. They turn to an analysis of a panel of 4-digit SIC manufacturing industries. They focus on the markup analysis of a panel of industries where they match detailed input-output (IO) data on government demand and data on employment, hours and output. Their estimation involves regressing the change in the markup, $\Delta\mu$ on the change in the natural logarithm of real shipments, $\Delta ln\left(Y\right)$.

$$\Delta\mu = \alpha_{0it} + \alpha_1 \Delta ln\left(Y\right)_{it} + \epsilon_{it} \tag{24}$$

In order to isolate demand-induced changes in shipments, they instrument for shipments with the industry government demand variable. In sum, the results are that there is no evidence that markups are countercyclical in response to government demand changes. In conclusion, this paper has presented evidence that markups are largely procyclical or acyclical. They find no evidence of countercyclical markups, even if they look at aggregates or detailed manufacturing industries, average wages or marginal wages. They find that all measures of the markup are procyclical or acyclical. These results hold even when are considered changes in output driven by monetary policy or government spending. A monetary shock appears to lead to higher markups in quarterly data. Their results call into question the basic mechanism of the leading New Keynesian models. These models assume that monetary policy and government spending affect the economy through their impact on markups. If prices are sticky, an increase in demand should raise prices less than marginal cost, resulting in a fall in markups. Even with sticky wages, most New Keynesian models still predict a fall in markups. The empirical evidence they found suggests that the opposite is true.

2.3.2 The behaviour of markups, direct evidence across space and time.

Anderson et al. (2018), in the paper named "Markups across space and time", provide direct empirical evidence on the cyclical properties of markups, based on gross margins for retail industry. They focus on the retail sector for their predominant variable cost, which is the cost of good sold that can be used as a proxy of marginal cost. Moreover, estimates of the frequency of price changes and other statistics computed using retail prices have been used to evaluate nominal rigidities and to calibrate macro models. The analysis focuses on the retail rector, using two datasets. The first dataset is a panel data on sales, costs of goods sold, selling and administrative expenses, and net profits for retail firms for the period from 1979 to 2014. Through this first dataset Anderson et al. (2018) constructed two measures for each firm in each considered quarter:

- gross margin: the difference between the sales and the cost of goods sold, over the sales;
- net operating profit margin: gross margins minus other expenses over total sales.

The term " Other expenses" refers to the sum of overhead expenses, rent, labour costs, and capital and property depreciation. For the retail sector such expenses are predominately fixed or quasi-fixed costs. The second dataset is a scanner dataset that contains weekly observations on quantities sold, retail and wholesale prices for each item in each of the retailer's stores for the period 2006-2009. The scanner dataset allows to construct gross margins for each item, in each store, in each country at any point in time:

- gross margin: the difference between price and replacement cost over price.

The advantage of the scanner dataset rests in some of its key figures: it contains the price of every transaction and not the average price across transactions; the cost data measures the replacement cost, good proxy for marginal cost; the marginal cost is available at store level, which allows to compute markup for each store and item at any point in time. Besides the two datasets Anderson et al. (2018) use data on the unemployment rate, real GDP growth, and estimates of monetary policy and oil price shocks too. They identify monetary policy shocks from high-frequency Federal Funds futures and oil price shocks through Ramey and Vine (2011) approach. After having identified the variables Anderson et al. (2018) proceed studying their cyclical properties at three levels of aggregation: aggregate retail sector, firm-level evidence and product-level evidence.

Anderson et al. (2018) models. In the section reserved to the analysis of the aggregate retail sector, Anderson et al. (2018) present the result of the elasticity of gross margins, net operating profit margins (computed using aggregate sales and costs), sales and cost of good sold with respect to real GDP. They regress the year on year log difference of each variable on the year on year log difference in real GDP.

Figure 5a: Cyclicality of Aggregate Retail Trade Variables

	Elasticity wrt GDP			
	Quarterly		Annual	
Gross margins	0.162	(0.256)	0.376	(0.616)
Operating profit margins	2.286**	(0.895)	5.233	(3.632)
Sales	8.089***	(0.45)	9.279***	(1.976)
Cost of goods sold	8.104***	(0.43)	9.140***	(2.154)

Notes: Variables are log-difference from prior year. Data is from Compustat and the BLS. Each row is estimated from a separate regression of the variables on GDP. We estimate the elasticities at quarterly and annual frequencies. See text for more details. Standard errors are in parentheses. *, **, and *** give the significance at the 10, 5, and 1 percent levels.

Results show that gross margins are roughly acyclical or mildly procyclical. In contrast, sales and cost of goods sold are highly procyclical. Anderson et al. (2018) interpret these results as evidence that firms do not change markups in response to business cycle fluctuations, nonetheless these fluctuations affect quantities sold by firms and lead firms suppliers to increase the cost. Anderson et al. (2018) analyse the volatility of the same variables: net operating profit margins are the most volatile, while gross margins are relatively stable compared to all other variables; Anderson et al. (2018) see this evidence as suggesting that fixed costs might be a crucial driver for profitability.

In the section related to firm-level evidence, elasticity is studied using the same regression of the aggregate analysis, with the addition of firm fixed effects, these are useful to cancel out intrinsic differences between firms and differences in the degree of their vertical integration. Results show positive and statistically significant elasticities of operating profits, sales and cost of goods sold, while the elasticity of the gross margin is small and statistically insignificant. Anderson et al. (2018) specify that the aggregate evidence is coherent with the firm-level evidence, thus suggesting that business cycles primarily affect quantities sold by firms and any cost increase from suppliers, rather than their gross margins.

Anderson et al. (2018) analyse variables volatility (constructed computing the standard deviation of each variable for each firm and averaging at firm level): operating profit margins result again the most volatile variable, while gross margins is the least volatile.

Anderson et al. (2018) also analyse the response of gross margins and net operating profits to both monetary and oil price shocks: the response of gross margins in not statistically significant to both shocks, while net operating profits fall in response to these shocks in a statistically significant way. Anderson et al. (2018) highlight the divergence of the responses they found with respect to New-Keynesian models theory[10].

The product-level analysis counts on a rich dataset which includes transaction prices and replacement costs at the SKU level (stock keeping unit code), allowing to compute gross margins for every product in every store. Anderson et al. (2018) show graphically the reaction of retail sector to 2009 recession: gross margins remained relatively stable with a small shift to the left, in contrast, the distribution of year-on-year log difference in sales is skewed to the left in the Great Recession than in the 2006-07 period, meaning that lower sales are associated to a smaller assortment and stable gross margins. Anderson et al. (2018) estimate, with the following regression, the elasticity of the margins of interest with respect to the local rate of unemployment and local real house prices, two possible alternative explanatory variables are considered: the local unemployment rate and house prices instrumented with the housing supply elasticity from Saiz (2010).

$$\Delta log\ margins_m = \beta_0 + \beta_1 \Delta log\,(Z_t) + \gamma X_m + \epsilon_m \tag{25}$$

A set of additional controls is included, like local area income, racial composition, median age, manufacturing industry share of employment and share of college educated workers. The elasticity of the gross margin is statistically insignificant with respect to unemployment and it is positive and statistically significant with respect to local house prices. The elasticity of sales is statistically significant for both the

[10]Moreover, Anderson et al. (2018) describe these models: New-Keynesian models generally predict that gross margins rise in response to monetary shocks and fall in response to oil-price shocks. Monetary shocks are contractionary, so they produce a fall in marginal costs. Since prices are relatively stable, the gross margin rises. Oil-price shocks are also contractionary, but they produce a rise in marginal costs and a fall in the gross margin.

unemployment rate and local house prices, indicating that sales rise in periods of local economy booms. About the standard deviation, prices and cost of goods sold result relatively stable, while sales and the number of unique items in store's assortment are quite volatile.

Anderson et al. (2018) make also a cross-sectional analysis of the level of gross margins across regions. They decompose the whole variance in the gross margins into a time-series and a regional component, the result is that most of the variation in markups comes from the cross section, not from the time series. To study the source of regional variation in markups, the variance of markups across different markets conditional on period t is decomposed in three pars: the first measures the importance of differences in gross margins for the same item, this term is zero when there is uniform pricing in different regions, the second term measures the importance of differences in assortment holding fixed the gross margin across regions, this term is zero when all regions have the same assortment composition, the third term measures the importance of the interaction between differences in assortment and differences in gross margins. Results are computed restricting the sample to items sold in every market and also including items sold only in a subset of regions. Anderson et al. (2018) results suggest that differences in assortment composition across regions are the main driver of regional differences in gross margins. In contrast, regional differences in the markups of the same items account for very little of the regional variation in gross margins. Meaning that, when the same item is available in different regions, retailers use roughly uniform pricing. Results also report that gross margins are positively correlated with measures of income or wealth, while are uncorrelated with a measure of competition. There is a positive cross-sectional correlation between local income and local gross margins. But these differences in gross margins across regions are driven by differences in assortment, not by deviations from uniform pricing. The evidence found supports business cycle models that generate acyclical or weakly procyclical retail markups, but none of this model supports the evidence of a correlation between markups and income in the cross section. The models that generate a positive correlation between markups and income are trade models with non-homothetic preferences: Bertoletti and Etro (2016) consider a version of the Dixit-Stiglitz model of monopolistic competition with a non-homothetic aggregator. However, this model is inconsistent with the nature of the regional variation in markups found in the data, but Anderson et al. (2018) evidence suggests that markups vary with income or wealth because richer regions buy an assortment of goods that is different from poor regions. In contrast, the Bertoletti and Etro (2016) model implies that regions with different levels of income have different markups for the same item. Anderson et al. (2018) propose their model that aims to be consistent with both the time-series and cross-sectional evidence. The economy is populated by a representative agent who maximizes his lifetime utility, negatively related to hours of labour, while positively related to the consumption of an homogeneous good and to the shock of labour supply.

The consumption bundle of quality q_t of the agent has n differentiated goods, high quality consumption bundles are produced with more differentiated inputs. The household problem is divided in two steps: the first step is to find the efficient consumption of varieties, minimizing total expenditure, for a given level of consumption. Households choose the quality of consumption bundle and the amount consumed of each individual variety with a specific level of quality. The second step is to maximize lifetime utility subject to the household's budget constraint. The monopolist of variety i supplies the level of quality demanded by consumers, maximizing profits. Producers of the homogeneous good produce competitively. In equilibrium, households maximize their utility, taking wage rate and prices as given. Monopolists maximize profits taking the wage rate, the aggregate consumption bundle and the aggregate price of the bundle of consumption varieties as given. Producers of the homogeneous good maximize profits, taking prices as given. To assess the model's regional implications, Anderson et al. (2018) compare regions that have different productivity levels and thus with different levels of real income. Higher productivity regions have higher markups and a higher number of varieties. To assess the cyclical properties of the model are considered the effects of temporary shocks to productivity and labour supply. About the productivity shock households increase the quality of the goods consumed and thus the markup for differentiated goods increases. Instead, markups do not respond to labour supply shocks. In sum, the model implies that markups are mildly procyclical. They do not respond to labour supply shocks and are procyclical with respect to changes in productivity. In conclusion, this paper study the behaviour of markups both from a cross sectional prespective and from a time series perspective, so analysing them in space and time. Markups result stable in time and midly procyclical; at a cross sectional level the regional dispersion in markup is high and the correlation between income and markup is positive; differences in markup across regions are explained in difference in assortment not deviations from the uniform price. Anderson et al. (2018) present a model that is consistent with dispersion in markups across regions. Regions with higher incomes driven by higher productivity choose higher quality goods and pay higher markup.

2.3.3 How credit crunch affects price dynamics

Kim (2018) analyses the period of financial crisis and tries to give an answer to these questions: Do firms that face a negative supply shock decrease their output prices? If so, what are the aggregate implications? At the peak of credit market stress following the September 2008 failure of Lehman Brothers, the data show a clear positive correlation between inflation and credit market conditions, it is difficult to identify the relationship between these series from the aggregate data. The aggregate correlation is based on recession and standard macroeconomic models can easily explain deflation during recessions without taking into account credit market conditions. Kim (2018) faces this identification challenge building

an innovative micro level dataset that combines producer's prices and sales at the bar code level with producers' balance sheet information and their loan market access. The great novelty of this paper is that it constructs a micro-level dataset that integrates producers' output prices and quantities, their inventories and cash holdings, and their relationships with banks. The data about product prices are very fine, at the barcode level. This measure helps uncovering the effects of introduction and destruction of products on prices but also allows the comparison of similar products produced by firms facing different degrees of credit supply shock. The dataset provides also product sales information, this way is possible to disentangle the quality component of product prices and to confirm that the effect is not driven by the change in product demand. These data record circumstantial characteristics of purchasers, such as income and employment, the location and retail store where products were purchased and product-level information such as product unit and size. This information can be helpful to solve some identification issues regarding the change in purchasers' income and employment, housing price, local conditions, and retailers' behaviour. The prices and quantities of each product are merged with its producer's information: administrative, financial, production and ownership information. The dataset records firms' inventory and cash holdings, extremely helpful in testing the fire sale of inventory hypothesis. It also has information on detailed four-digit NAICS industry codes, the number of foreign subsidiaries and branches, total assets, and the number of employees, which allows to conduct additional empirical analyses and robustness checks. Finally there are information on bank lending to each producer: for each loan (or facility/package), the data include information on its purpose (e.g., corporate purposes or debt repayment), type (e.g., term loan or revolving line of credit), amount, interest spread, maturity, and lender information, identifying the lead arranger and the lender's contribution to each loan. The credit supply shock is constructed using loans identified as serving a corporate purpose or serving as working capital. Data also contain the housing price and home ownership to specifically address the drop in housing prices and home ownership during this period. Additionally, are present several bank-level variables used to reflect a change in bank health at the time of Lehman failure, demand elasticities and industry-level inventory information. Using the micro-level data discussed before is analysed the effect of credit market stress on output prices and inventory dynamics. Kim (2018) follows Chodorow-Reich (2014) to construct the credit supply shock measure, which extracts information on changes in firms' access to credit as a consequence of a change in bank health. Two periods are studied: pre and post Lehman(2005/2007 and 2008/2009), to measure the credit supply shock to exploit the Lehman failure, which is known to be surprising and dramatic. For the main regression analysis the quarter immediately before and after the failure are not used. Based on this timing, it is constructed the measure of bank shock, given the change in bank health measures, Kim (2018) takes a weighted average of bank health for each firm to generate the firm-specific credit supply

shock, this is used as a measure of the firm-bank-specific change in bank health. The firm-bank-specific change in bank health is a change in the number of loans issued by banks: the number of loans made by bank b in the post-Lehman period over the number of loans made by bank b in the pre-Lehman period. Concerns about the credit demand channel are solved taking into account the weight for each loan made by the bank b to firm j and omitting firm f from the summation to generate the firm f bank b specific change in bank health. To assess the validity of the credit supply shock measure, Kim (2018) checks the sample balance and find no significant difference in firm characteristics on the credit supply shock. The first regression is of the pre-Lehman firm-level characteristics across the credit supply shock. The result is that the credit supply shock is not correlated with purchasers' characteristics or with firms' access to the loan market, listed status, bond market access, age, size, or loan characteristics. These results suggest that the measure of credit supply shock constructed for this period reflects the change in bank health rather than borrower or purchaser characteristics. In addition to the measure of credit supply shock constructed above, three bank-level measures of the change in bank health are used as instrumental variables to confirm the findings:

- banks' exposure to Lehman: is the fraction of a bank's syndication portfolio in which Lehman Brothers had a lead role. This measure is built on the notion that certain banks dealt more with Lehman Brothers than others and decrease their lending relatively more after the Lehman collapse. This happens because borrowers that had a credit line in which Lehman Brothers had a lead role aggressively draw down their credit lines when the lead lender becomes bankrupt because of the precautionary motive, draining the liquidity of others that dealt with Lehman;

- banks' exposure to asset-backed securities (ABX): the correlation between its daily stock return with the return on the ABX AAA 2006-H1 index. This index generates the variation in changes in bank health due to banks' exposure to the toxic residential mortgage-backed securities issued during the second half of 2005;

- bank statement items that are unlikely to be correlated with borrower characteristics: is the sum of the bank's net trading revenue and bank deposits divided by its assets before the Lehman failure.

All these measures are capable to generate variations in a change in bank health reasonably orthogonal to a borrower's pricing decision. The correlations among these three variables are weak at the firm level in the sample, generating presumably independent variation in the producer's credit supply condition. Kim adapts the nested CES demand system in Hottman et al. (2016) to build the firm group specific price index from the panel database. The following regression examines effect of a credit supply shock on

producers' output price dynamics.

$$\Delta lnP_{fg} = \lambda + \beta \Delta L_f + \theta X_f + \epsilon_{fg} \tag{26}$$

The basic assumption in the identification of the causal effect of β is that any confounding factor that affects a firm's pricing decision does not simultaneously affect its lender's lending to other firm, a big identification threat, might occur when a demand shock can lead to these two conditions happening simultaneously. However, the assumption is supported by the evidence found in the data: the empirical pattern of aggregate price and quantity of loans during this period supports this view. Other things are taken into account in the regression analysis: first a rich set of firm level characteristics is used to address potential spurious correlation, second firms' liquidity substitution from loan markets to bond markets when banks cannot provide a loan, third the differential degree of loan market access for each firm and then firm specific characteristics. The result is that a one standard deviation increase in negative credit supply shock decreases output prices of approximately 8%. The result seems counterintuitive, a lot of studies think of financial distress connected to a rise in credit cost, predicting an increase in prices due to a negative credit supply shock. Results are sustained by Kim (2018) hypothesis that when firms face a negative credit supply shock and cannot borrow from banks, they have an incentive to aggressively liquidate their inventories and sell their products at a low price to generate extra cash flow from the product market. From a corporate liquidity management perspective, firms that cannot borrow from their lenders try to accumulate cash by selling their inventory at low prices to generate extra cash. At the aggregate level, inventory holdings decreased drastically after the Lehman failure, supporting the plausibility of the hypothesis, at least at an aggregate level.

To support empirically this hypothesis Kim (2018) uses the following regression specification:

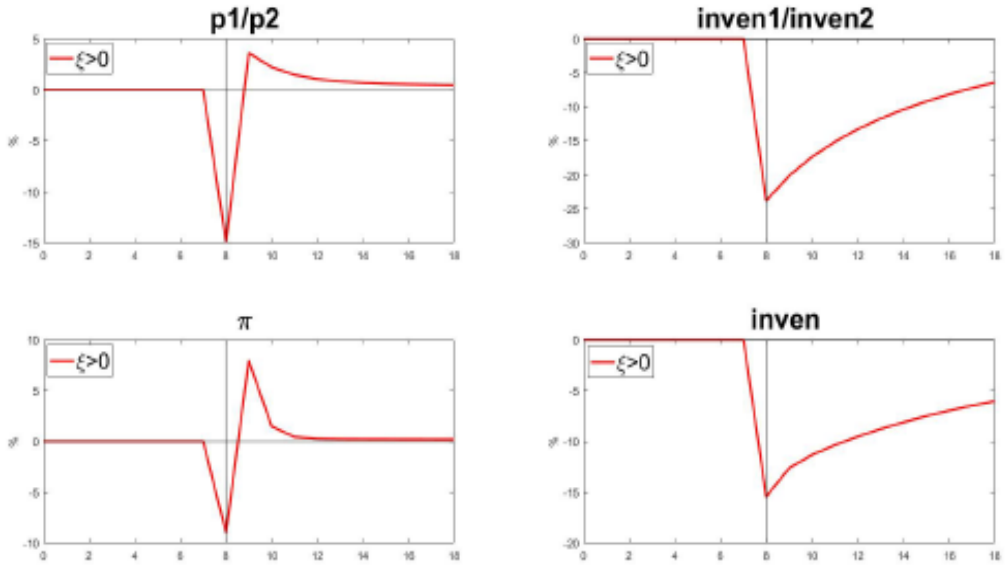
$$\Delta Y_{fg} = \lambda_g + \gamma \left(-\Delta L_f\right) + \theta X_f + \epsilon_{fg} \tag{27}$$

where ΔY_{fg} equals four dependent variables: change in inventory, market share, cash holding, and employment. The response to a negative credit supply shock of a firm is to liquidate their inventories, moreover they increase their market share, suggesting that they increase sales selling more of their products and generate extra cash. These firms also lay off workers. Note that firms that face a negative credit supply shock can increase sales even they decrease production (or employment) because they draw down their inventories to generate extra cash flow from the product market. Kim (2018) makes a theoretical analysis presenting a business cycle model based on micro-level empirical evidence in order to shed light on aggregate inflation and inventory dynamics. Firstly is presented a simple model with two identical producers with matched micro-level data to formalize the mechanism. The model is then extended to examine the dynamics of aggregate inflation and inventory.

The simple model, based on Iacoviello (2005) and Wen (2011), is characterized by two types of agent: households and two identical representative entrepreneurs, they only differ because they face different degrees of credit supply shock. Entrepreneurs face the borrowing capability that is exogenously given to them, is made an experiment to see the micro-level analysis of the differential change in variables. The experiment is that an unexpected decrease in a representative entrepreneur's borrowing capacity is used to determine how the output price, sale, inventory, and employment dynamics evolve compared to the other. To integrate the fire sale of inventory hypothesis, Kim (2018) assumes that entrepreneurs produce a continuum of products and that each product face an idiosyncratic shock. The shock occurs after the production, this time lag gives them the incentive to store products in inventory to avoid product stock-out. Introducing multiple products with idiosyncratic shock makes an inventory positive at the steady state and makes it easy to apply the conventional log linearization technique to solve the model. Moreover, this formulation allows the introduction of capital, another form of saving, without inducing firms to hold capital over inventory. Inventory yields a liquidity premium to facilitate sales, giving companies an incentive to hold both inventory and capital. This feature is useful in the extended model, in which entrepreneurs invest in capital. Note that entrepreneurs hold inventory to avoid product stock-out, not to hedge against a decrease in their borrowing capability. This statement is consistent with the micro level empirical evidence, because companies do not seem to hold inventory before the Lehman failure to hedge against the credit supply shock, but even if entrepreneurs did, the effect on output price is likely to be larger, as they are more likely to liquidate inventory due to the shock. The simple model captures the micro-level empirical evidence and formalize the fire sale of inventory hypothesis. The experimental decrease in type 1 entrepreneur's borrowing capability reflects the differential change in producers' credit supply condition analysed with the micro-level data. When the shock is realized, there is a large increase in the marginal utility of entrepreneur 1 because he or she wants to smooth the consumption. This consumption-smoothing motive enables entrepreneur 1 to aggressively liquidate the inventory and sell it at a low price in the product market to generate extra revenue. Since entrepreneur 1 initially holds inventory to avoid stock-out of production, not to hedge against the credit supply shock, this fire sale leads to a greater stock-out of products and corresponding larger inefficiency. This inefficiency, in turn, makes entrepreneur 1 lay off workers. Note that the model generates a temporary decrease in the relative output price. This relative price dynamics occurs because entrepreneur 1 decreases employment and production, but increases sales, so increases its market share, as he or she draws down inventory. Kim (2018) expands the model adding money, price rigidity, a central bank, and capital investment. Kim (2018) wants to study aggregate inflation dynamics and introduces money into the household utility, retailers with Calvo-Yun price rigidity, and the central bank that follows the Taylor rule. The results remain that

entrepreneur 1 faces a negative credit supply shock and aggressively liquidates inventory and lowers the price to generate extra sales to smooth consumption. In the following period, entrepreneur 1 accumulates inventory and raise the price, leading both aggregate inflation and relative price to increase. According to the comparison between the impulse response generated from the model with the U.S. producer price index and inventory data, the magnitude of the shock explains around 10% of the drop in the output price, this drop in inflation explains almost all of the drop in the producer price index during the financial panic of 2008 under the standard parameter calibration. From the Figure 4 is clear that in the next period inflation blows up, this happens because entrepreneur 1 raises the price back to the original level.

Figure 4: Aggregate and Differential Response of Price and Inventory with respect to the Negative Credit Supply Shock



Note. The top-left panel shows the dynamics of relative output price, the top-right panel shows the dynamics of relative inventory, the bottom-left panel shows the dynamics of aggregate inflation, and the bottom-right panel shows the dynamics of average inventory due to the negative credit supply shock to type 1 entrepreneurs.

This increase is consistent with the "missing disinflation puzzle", which discusses that inflation did not fall during the 2007-09 recession despite high unemployment and low demand. Consistently with past literature, the puzzle in the model is explained by credit supply shocks that counteracts the usual deflationary force. The mechanism proposed by Kim (2018) on the micro-level empirical analysis, explains the stable medium-run inflation dynamics, the "missing disinflation puzzle", a short run drop in inflation and also generates a large decrease in inventory, consistent with the data. Additionally Kim (2018) estimates heterogeneous treatment effects across firms and sectors and implement numerous robustness

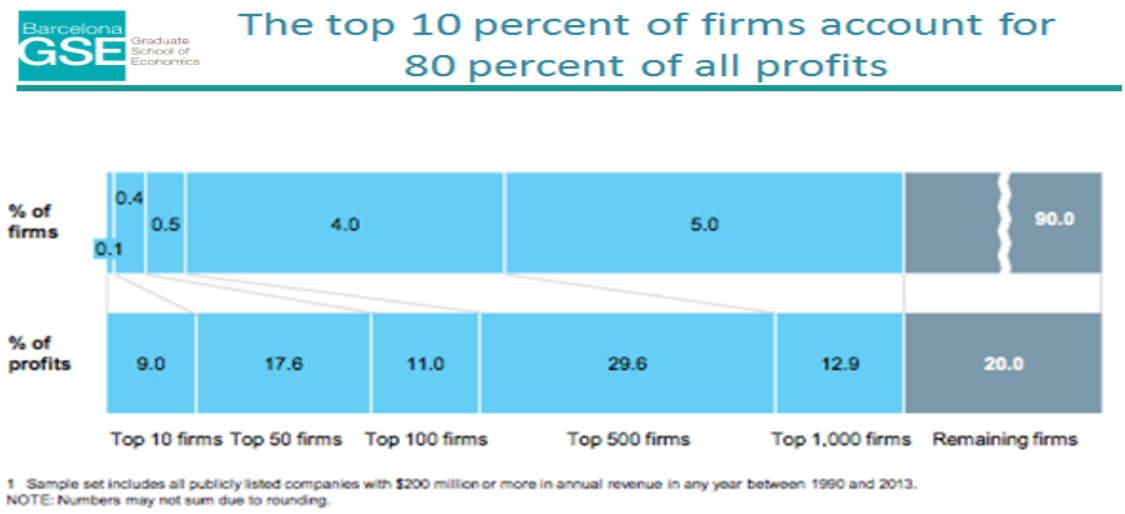
tests to confirm the hypothesis. To sum up Kim (2018) finds that firms facing negative bank shocks decrease their output prices more if (i) they face high product demand elasticity, (ii) they rely more heavily on the loan market, (iii) they did not issue a bond before the credit supply shock was realized, (iv) they had to pay out loans immediately after the Lehman failure, (v) they dealt with a small number of lead-lenders in the pre-Lehman period, or (vi) they are small in terms of employment or total assets. Firms that face high demand elasticity are more likely to decrease their output prices when they face a negative credit supply shock because they can sell more products while experiencing a smaller decrease in output prices. In conclusion the paper points out the calibre of the relation between inventory dynamics and inflation dynamics during the banking crisis. Standard business cycle models with financial friction put emphasis on the cost-push channel or other channels that lead companies to increase their prices due to financial friction. However, there would be inconsistency between this increase in output price and the micro-level empirical evidence in this article. The model that incorporates the inventory mechanism and the traditional effect will capture the large decrease in the price growth rate in the short run, which was followed by stable inflation despite the large increase in the unemployment rate during the banking crisis. Kim (2018) analyse first a novel micro-level dataset which shows that a change in bank health at the time of the Lehman failure as an exogenous variation of companies credit condition, leads firm to shrink their output prices. To explain the empirical findings, Kim (2018) supports the hypothesis that the firm facing a negative credit supply shock decreases its price because needs to sell inventories to generate extra cash. The hypothesis is supported from empirical data which show that both aggregate inflation and inventory fall but corporate cash holdings rise. Moreover Kim (2018) shows that firms facing a negative credit supply shock reduce their inventories and increase their market share and cash holdings, sustaining the hypothesis. Then Kim (2018) builds a simple dynamic general equilibrium model to formalize this mechanism explicitly and to analyse aggregate inflation dynamics. As a result of the adverse credit supply shock for a group of producers, the model predicts a drop in the relative price by firms that face a negative credit supply shock, consistent with the micro-level empirical evidence. The model is able to incorporate the aggregate inflation dynamics consistently with what was observed in the middle of financial panic, a key element of this prediction is the "fire sale" of inventory mechanism, included in the model. The best result of this paper is to incorporate inventory and liquidity management in a central element of output price dynamics. The innovation with respect to old literature is the awareness that models which include inventories will better account for the fluctuation of inflation, inventory and other aggregate variables.

2.3.4 Rising concentration and market power. The role of competition policy

In a conference held in Naples in 2018 Motta focused particular attention on the markups' trend, he pointed out that markups follow an increasing trend in the last decades: from 1.1 in 1960 to almost 1.7 in 2010. Evidence reports enhanced concentration, profitability and market power; sectoral concentration has increased, firm's profitability distribution is more unequal, maybe due to the increase of big business. Also profit rates of the whole economy raised during years. During the period 1960-2010, the total size of average dividend increased of 1,5 millions.

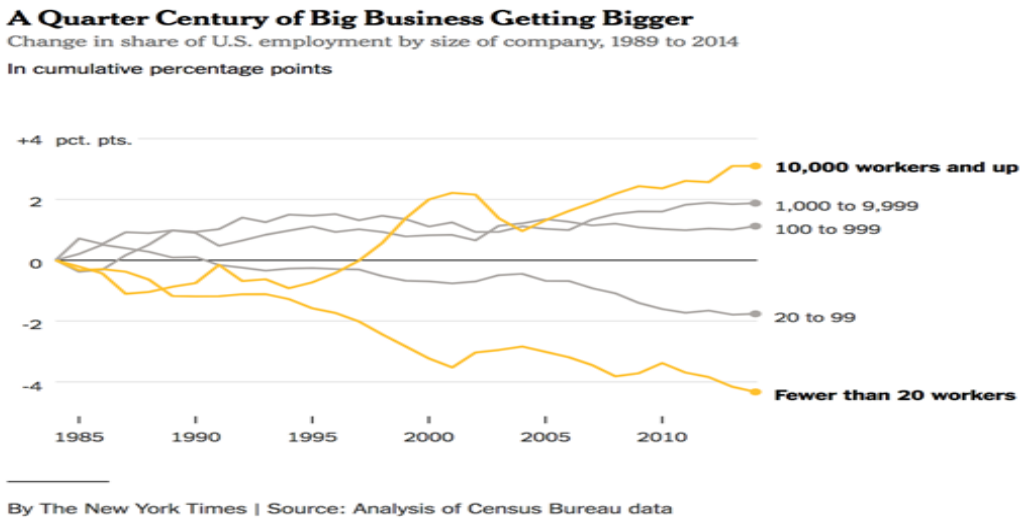
The total size of profit pool, computed on a dataset of both publicly listed and private held firms, passed from being 5,0 trillion dollars in 1980 to 17,3 trillion dollars in 2013. Profits in the economy tripled in these years, but the distribution of these profits results to be very asymmetric: the figure below shows that between 1990 and 2013 the top 10 % of firms account for 80 % of the total profits.

Figure 5: Top 10 per cent firms account for 80 percent of all profits



Moreover, about the economy as a whole, profits rates passed from 0.02 to 0.12 in the last fifty years. Big businesses became bigger: big firms increased their number of workers of 4 percentage points during 1995 and 2010 , while small firms decreased their number of workers of 4 percentage points.

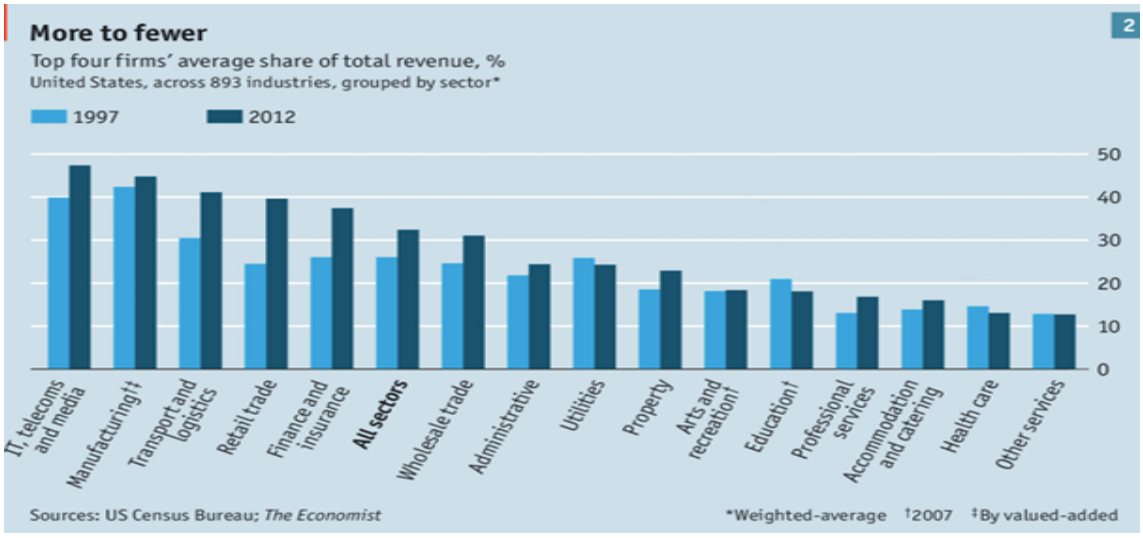
Figure 6: A quarter century of big business getting bigger



In 2012 the top four firms in the economy shared almost 30 % of the total revenue, for the IT sector the top four shared almost 50 % of the the total revenue, while in 1997 the top four firms in the economy shared almost 25 % of the total revenue, for the IT sector the top four shared almost 40 % of the total revenue. Competition collapsed around 1995 and 2017, the number of competitors decreased and the market pressure remained stable.

Figure 7: The Evolution of Global Average Markups (1980-2014)

(De Loecker and Eeckhout, 2018)



It is crucial to understand in what ways the increasing pattern of markup and concentration has to be considered an issue. Higher concentration and increased profits prospective are signals that firms are not competing as they should. The problem is not profitability per se, because the expectation of profits

is one of the factor that induces to investment and innovation, but competition is the most important factor for productivity growth. Competition, in fact, brings on one hand to internal productivity, because firms have incentives to invest and innovate, on the other hand brings to sectoral productivity: under competition inefficient firm exit and high productivity ones replace them. The concern of Motta is focused on the reasons behind this suspected anticompetitive behaviour from firms. One reason might be weak antitrust enforcement, in fact, there is not a clear free/entry exit system; indeed, policy should remove barriers to entry, but also should not protect inefficient firms. Economists of Chicago school usually bring arguments against the abuse of dominance and anticompetitive exclusion, while, modern economists find it rational and profitable in some cases: in industries where— demand or supply side—scale economies matter, if a dominant firm deprives the more efficient entrant of key buyers, the latter will not be able to operate profitably: the dominant firm will act as a monopolist upon the remaining buyers recovering losses experienced to attract critical customers away from the entrant. Motta gives another reason to the increasing pattern in markups: technology progress reshapes the structure of balance sheet costs. There is an increase in fixed costs with respect to total cost, then the difference between price and marginal cost has to increase, because the firm has to cover a cost that has grown with respect to past years.

2.3.5 Evaluation of the welfare cost of markups and policies aimed at reducing them

Edmond et al. (2018) try to answer questions about how large are welfare costs of product market distortion and what kind of policies would be ideal to overcome these distortions. They approach to these questions with a dynamic model with heterogeneous firms and endogenously variable markups. In the model the welfare cost of makups can be decomposed in three channels:

- aggregate markup, the costweighted average of firm-level marups, acts like a uniform output tax levied on all firms;
- cross-sectional markup dispersion, because larger firms effectively face less competition and thus can charge higher markups than smaller firms. This markup dispersion leads to misallocation of factors of production across firms;
- inefficiently low rate of entry.

Edmond et al. (2018) aim in this paper is to quantify these three channels using U.S. data and to evaluate policies aimed at reducing the cost of markups. The model features heterogeneous firms in a monopolistic competition with non-CES demand, as in Kimball (1995). In equilibrium in a given industry, larger firms are more productive and face less elastic demand, this allows them to charge higher markups than less productive firms. The consequence would be that changes in the environment, such that more productive

firms are allowed to grow at the expenses of less productive firms, would lead to an increase in aggregate markup and a decline in the aggregate labour share. Literature focuses on the reallocation of production from firms with relatively high measures of labour shares to firms with relatively low measured labour shares; the model presented is aligned with this view and with the evidence that firms with high markups have been getting larger turning up the average markup.

In the model presented by Edmond et al. (2018) markups are returns for old investments made for developing new products and in acquiring capital. These investment decisions may be distorted by policies aimed at reducing markup distortion. The welfare cost of markup is computed by Edmond et al. (2018), they ask how much the representative consumer would benefit if the economy passed from a steady state with markup distortion to an efficient steady state. They calibrate the initial steady state to match the levels of concentration in sales in US data as well as the firm-level relationship between sales and the wage bill. They find that the total welfare costs of markups are large: the representative consumer would gain 7.5% in consumption-equivalent terms if they transitioned from the initial distorted steady state to the efficient steady state. The three channels by which markups reduce welfare in the model result to have different weights: aggregate markup distortion is the most important channel, accounting for 70% of the total costs in the benchmark model; misallocation accounts for about 30% of the total costs; inefficient entry generates negligible costs. Edmond et al. (2018) calibrate their benchmark model to match an aggregate markup of 1.15, corresponding to the 2012 estimate of Barkai (2017) for the US private sector. De Loecker and Eeckhout (2017) used Compustat dataset and estimated a 2012 economy-wide markup of about 1.6, this is the sales weighted average of firms level markups, but theory implies that the relevant statistics to summarize the distortion to employment and investment decisions is the cost-weighted average of firm-level markups. Edmond et al. (2018) computing the cost-weighted average using the same Compustat data, obtain a markup of 1.25. The alternative calibration of the model that matches this higher level of markups brings to the result that the representative consumer would gain 18.6 % in consumption equivalent terms from the removal of all markup distortions, which are mostly due to aggregate markup and in a minimum part to misallocation. The Compustat dataset includes just very large U.S. firms, so Edmond et al. (2018) think of these large losses as an upper-bound on the total cost of markups. Losses from misallocation estimated by the model are sizeable relative to standard estimates in literature (Restuccia and Rogerson, 2008); (Hsieh and Klenow, 2009). Misallocation losses result relatively small because high productivity firms charge higher markups because they face low demand elasticity. With these low demand elasticities the aggregate technology features a kind of near satiation where there are strongly diminishing returns to increasing the output of an individual firm. The technology feature implies that the benevolent social planner cannot expect large gains by reallocating production factors

towards high productivity firms. If the model used constant demand elasticity, as is used in literature, it would have predicted larger losses from misallocation deriving from markup dispersion. Constant demand elasticity would lead to large gains if the planner reallocates factors of production towards high productivity firms, so is more costly a given amount of markup dispersion. Decomposing in three parts the channels by which markups reduce welfare, helps evaluating policies aimed at reducing markups. Efficient allocation might be reached through sophisticated schemes, but simple policies may be more practical. An example of simple policy may be subsiding the entry of new firms, to raise competition, but this is not an effective policy tool in the model: has a negligible effect on both the aggregate markup and the amount of misallocation. Aggregate markup is a cost weighted average of firm level markups, so increasing firm number has two effects on this weighted average:

- Direct effect: a reduction in the markup of each firm;
- Compositional effect: in the model small firms face more elastic demand and are vulnerable to competition from entrants, large firms face less elastic demand and are less vulnerable to competition. So, when there is an increase in the number of firms, small, low markup firms contract more than large high markup firms and the resulting reallocation leads high markups firms to get more weight in the aggregate markup calculation.

In the model both effects are equally large, so the overall markup falls by a negligible amount. Another simple policy to reduce markup may be the use of size-dependent taxes to reduce within industry concentration and consequently markup of large producers. Antitrust policies may be simply modelled introducing taxes that fall disproportionately on large firms, this can sensibly reduce aggregate markup in the model, but with considerable costs. This is because in the model, the distorted allocation features too little concentration relative to the efficient allocation and a further reduction in concentration increases misallocation thereby reducing aggregate productivity. Ways to design policy responses to the simultaneous rise in concentration and markups may be influenced by this result. The rise in concentration and markup may come from changes in regulation, in the scalability of technology, a mix of the two, but, independently of the cause, policies aimed at reducing overall markup levels may fail because of the resulting increase in misallocation. From an empirical point of view this suggests that if the rise in concentration and markups, observed in U.S. data, for instance, is due to weaker antitrust enforcement, then it may be the case that the aggregate level rose, but at the same time misallocation fell. This might be consistent with Baqaee and Farhi (2017) who show that increase in the U.S. in concentration has been accompanied by increase in allocative efficiency. Edmond et al. (2018) show that their results do not depend on assumptions about the market structure. The benchmark model uses monopolistic

competition with non-CES demand. During robustness checks Edmond et al. (2018) study an alternative model in which variable markups arise due to oligopolistic competition among a finite number of heterogeneous firms, as in Atkeson and Burstein (2008) and Edmond et al. (2015). When this model with oligopolistic competition is calibrated to match the same US concentration facts as the benchmark model, the result is that losses from misallocation are relatively small and that even large increase in firm numbers lead to small effects on the aggregate markup and misallocation. In conclusion, the paper aim is to study the welfare costs of markup in a dynamic model with heterogeneous firms and endogenously variable markups, then it tries to evaluate policies aimed at reducing markup costs. First they get to the result that the total welfare costs of markups are large: the representative consumer would gain 7.5% in consumption-equivalent terms if they transitioned from the initial distorted steady state to the efficient steady state. Edmond et al. (2018) consider three channels by which markups reduce welfare in the model result and have different weights: aggregate markup distortion is the most important channel, accounting for 70% of the total costs in the benchmark model; misallocation accounts for about 30% of the total costs; inefficient entry generates negligible costs. Evaluating the policies to reduce markups, Edmond et al. (2018) understand that: subsidizing entry is not an effective tool: while more competition reduces individual firms' markups it also reallocates market shares towards larger firms and the net effect is that the aggregate markup hardly changes.
Size-dependent policies aimed at reducing concentration can reduce the aggregate markup but have the side effect of greatly increasing misallocation and reducing aggregate productivity.

2.4 Final remarks

According to Rotemberg and Woodford (1999) if real marginal cost schedule does not change, the only channel that can induce variation in aggregate output is the variation in markup of price over marginal cost. The leading advantage for markup variation is the awareness that it enlarges the range of types of disturbances that can affect aggregate economic activity. The absence of variations in markups would imply that output can just rise if real marginal cost falls, for example due to a change in effective labour supply of firms or as a result of technological progress. The presence of variable markups makes that monetary and fiscal shocks can have effects other than those resulting from changes in real wages at which workers are willing to work. The analysis of marginal cost cyclicality brings to the result that for reasons like overhead labour cost and adjustment cost, marginal labour cost should appear more procyclical. They also show that the observed procyclical variation in productivity and profits are consistent with the hypothesis that cyclical variations in output are primarily due to markup movements than to changes in real marginal cost schedule.

Bils (1987) examines the cyclical behaviour of price/marginal cost margins, in U.S. manufacturing. This paper highlights the different movements of marginal cost and price during an expansion. First of all, prices do not respond to cyclical movements in the marginal cost, while short run marginal cost is markedly countercyclical, resulting in a countercyclical markup. Markups over marginal cost decline by 3.3 with a 10% expansion. This evidence is clearly inconsistent with a perfectly competitive view of manufacturing. Results do not support explanations of low production in recessions due to a high real cost of production, but they support the idea that production is low because firms are not able to sell their products.

Rotemberg and Saloner (1986) try to understand the response of oligopolies to movements in the demand for their product. Their result is that oligopolies that implicitly collude are likely to behave more competitively in periods of high demand; they show that oligopolistic industries have relatively low prices in these periods. In the end they study the macroeconomic consequences of this behaviour. They show that it is possible that if occurs a shift in the demand towards good produced by oligopolies there should be an increase in competitiveness that may be sufficient to raise the output of all sectors.

Jaimovich and Floetotto (2008) explain markup variations through the variation in the number of firms operating in the market, this variation brings to countercyclical variations in markups that lead to endogenous procyclical movements in measured TFP (Total Factor Productivity). On the basis of this result their paper suggests a decomposition from a structural point of view of TFP variations. The TFP variations will be decomposed in variations originated from exogenous shocks and variations originated endogenously from the interaction between firm's entry and exit decisions and the degree of competition (40 % of the movement of TFP are attributed to this last term). Again, the paper provides evidence that markups' cyclicality can be explained by an increase in competition due to firm-entry. When the demand for goods rises, new firms enter the market and compete by reducing prices.

Nekarda and Ramey (2019) study the cyclical properties of the markup of price over marginal cost to test the idea of New Keynesian models: markups as a leading transmission channel for demand and monetary shocks. This paper has presented evidence that markups are largely procyclical or acyclical. They find no evidence of countercyclical markups, even if they look at aggregates or detailed manufacturing industries, average wages or marginal wages. They find that all measures of the markup are procyclical or acyclical. These results hold even when are considered changes in output driven by monetary policy or government spending. A monetary shock appears to lead to higher markups in quarterly data. Their results call into question the basic mechanism of the leading New Keynesian models. These models assume that monetary policy and government spending affect the economy through their impact on markups. If prices are sticky, an increase in demand should raise prices less than marginal cost, resulting in a fall

in markups. Even with sticky wages, most New Keynesian models still predict a fall in markups. The empirical evidence they found suggests that the opposite is true.

Anderson et al. (2018) provide direct empirical evidence on the cyclical properties of markups, based on gross margins for retail industry. The focus is markups both from a cross sectional perspective and from a time series perspective, so analysing them in space and time. Markups result stable in time and mildly procyclical; the regional dispersion in markup is high and the correlation between income and markup is positive at a cross sectional level; differences in markup across regions are explained by difference in assortment, not by deviations from the uniform price. Anderson et al. (2018) present a model that is consistent with dispersion in markups across regions. Regions with higher incomes, driven by higher productivity, choose higher quality goods and pay higher markup.

Kim (2018) analyses the period of financial crisis and tries to give an answer to these questions: Do firms that face a negative supply shock decrease their output prices? If so, what are the aggregate implications? Kim (2018) supports the hypothesis that the firm facing a negative credit supply shock decreases its price because needs to sell inventories to generate extra cash. The hypothesis is supported from empirical data which show that both aggregate inflation and inventory fall but corporate cash holdings rise. Moreover Kim (2018) shows that firms facing a negative credit supply shock reduce their inventories and increase their market share and cash holdings, sustaining the hypothesis.

Edmond et al. (2018) study the welfare costs of markup in a dynamic model with heterogeneous firms and endogenously variable markups, then they try to evaluate policies aimed at reducing markup costs. First they get to the result that the total welfare costs of markups are large: the representative consumer would gain 7.5% in consumption-equivalent terms if they transitioned from the initial distorted steady state to the efficient steady state. Edmond et al. (2018) consider three channels by which markups reduce welfare in the model result and have different weights: aggregate markup distortion is the most important channel, accounting for 70% of the total costs in the benchmark model; misallocation accounts for about 30% of the total costs; inefficient entry generates negligible costs. Edmond et al. (2018) sustain that to achieve efficient allocation, less elaborated policies might be more practical, for example the use of size-dependent taxes to reduce within industry concentration and consequently markup of large producers.

Ravn et al. (2004) introduces a model in which private agents are considered to form habits not simply on the overall consumption level, but on the consumption of individual goods. The implications for aggregate dynamics are two: first it is not possible to disentangle the demand side of the macroeconomy from the demand side related to an environment in which agents have superficial habits; second the supply side of economy is altered, in fact, when habits are formed at the level of individual goods, firms assume as certain that the demand they will face in the future will be depending on their current sales, in fact if

the consumption of a particular good is high in the current period, other things being equal, the consumer habits will influence him to buy the same good. When habits are stable, the optimal pricing problem becomes dynamic. The main result of this paper is that deep habits give rise to countercyclical markups, which is in line with the empirical evidence. This result is important, because ad *hoc* formulations of customer-market and switching-cost models have been criticized for implying procyclical and hence counterfactual mark-up movements. Under deep habits, consumption and wages respond procyclically to government-spending shocks.

Syverson (2019) analyses market power issue from various points of view. He makes a theoretical comparison of the definition of market power as price over marginal cost on one hand and the often-used approach of using concentration to measure market power on the other. He discusses on how macro market power research has used accounting data to estimate markups. He looks at how markups are necessarily related to prices, costs, scale elasticities, and profits and points out seeming inconsistencies among the empirical estimates of these values in the literature. Then he looks at some of the research that has linked a rise in market power to lower levels of investment and a lower labour share of income. Throughout this discussion Syverson (2019) identifies the consistencies and inconsistencies between macro evidence and micro views of market power and, when they do not perfectly overlap, explain the open questions that need to be answered to make the connection complete.

Berry et al. (2019) describe the structure-conduct-performance approach, which involves regressions with an outcome like markups or profits on the left-hand side, and a measure of market concentration on the right-hand side, along with various control variables. Moreover they analyse papers based on production function estimation which have made useful progress in measuring broad trends in markups. However, industries are so heterogeneous that careful industry specific studies are needed. Examples of such studies illustrate different explanations for rising markups, including endogenous increases in fixed cost associated with lower marginal costs. In some industries there is evidence of price increases driven by mergers. To fully understand markups, the key economic primitives of demand, marginal cost, and fixed and sunk costs have to be recovered. In Berry et al. (2019) opinion, both industry studies and accounting data studies point to the broad category of endogenously increasing fixed and sunk costs as an important, perhaps the most important, source of the apparent pattern of rising global markups. They conclude discussing the various aspects of antitrust enforcement that may be of increasing importance regardless of the cause of increased markups.

3 Cournot competition and number of firms

Consider the inverse linear demand of a homogeneous good produced by n firms $i = 1, ..., n$, each one producing output q_i:

$$p = a - \sum_{i=1}^{n} q_i \tag{28}$$

where $a > 0$ is a parameter representing the size of the market. To produce, any firm incurs in a fixed cost $k > 0$ and a variable cost cq_i where $c > 0$ is a constant marginal cost of production.

Solving the profit maximization problem of the firms competing as Cournot will lead to the following results:

$$q(n)_i = \frac{(a-c)}{(n+1)} \tag{29}$$

$$p(n) = \frac{(a+nc)}{(n+1)} \tag{30}$$

$$\pi(n) = \frac{(a-c)^2}{(n+1)^2} - k \tag{31}$$

$$\mu = \frac{p(n)}{c} = \frac{(a-c)}{(n+1)} \tag{32}$$

thus, an inverse relationship between price-cost margins and number of firms emerge. Similarly firm profit is decreasing with respect to the number of competitors.

We can consider the possibility that firms are free to enter the market as long as they can afford to pay the fixed cost. An upper-bound for the number of firms is due by n^* corresponding to the zero profit condition $\pi(n^*) = 0$:

$$n^* = a - c\sqrt{k} - 1 \tag{33}$$

at the upper-bound, the equilibrium output is $q_i = \sqrt{k}$, the total production is $Q = a - c - \sqrt{k}$, and the equilibrium price is $p = c + \sqrt{k}$ which implies a markup on the marginal cost to cover the fixed cost of production.

We can consider two different shocks:

- k changes, thus the number of firms changes. The markup changes, while the profit remains constant;
- n changes, thus profit and markup both change, accordingly.

4 The ancient *mafia* problem

Organized crime has been a crucial point of interest for economists, since Becker (1968). The government has been forced to embitter the judicial system against the *mafia* organizations, the main reason rests

in the peculiar shape of such organizations, which are internally structured as a cohesive and militarized fortress, based on violence and coercion. Deterrence against organized crime was simply impossible without specific laws from the legislator, the performance of investigations was very fleeting. Peculiar laws have changed radically conviction and imprisonment procedures. So, the study of organized crime is interesting also for the set of laws established that inspired a big part of organized crime literature. The pivot features of the social scientists literature on criminal organizations are different: they focus on various aspects of the problem. One strand focuses on the determining factors of criminal organizations, like the distribution of natural resources and the weakness of the institution (Gambetta, 1993; Bandiera, 2003; Dimico et al., 2012; Konrad and Skaperdas, 2012; Buonanno et al., 2015). Another strand analyses the consequences of organised crime in terms of firm productivity (Albanese and Marinelli, 2013), government efficiency (Godson and Williams, 1998; Allum and Siebert, eds, 2003), credit access (Patti, 2009) foreign direct investment (Daniele and Marani, 2011), money laundering (Schneider, 2010) or electoral competition (De Feo and De Luca, 2017; Mastrobuoni, 2015). Pinotti (2015) examines the post-war economic development of two regions in southern Italy exposed to *mafia* activity after the 1970s and apply synthetic control methods to estimate their economic performance in the absence of organised crime. Acconcia et al. (2014b) studied the introduction of an accomplice-witness program which appears to have strengthened deterrence and enhanced prosecution. Daniele and Geys (2015) investigate how legal institutions affect the influence of politically active criminal organisations on the human capital of elected politicians. In the following sections we describe the legislative process tackled by the legislator during the journey towards *mafia* deterrence.

4.1 The evolution of anti*mafia* legislation

Italian legislation process tried to identify and struggle "*mafia* type criminal association", and also focused on the economic resources of criminal individuals. It was in fact well established the strength of the Italian criminal organizations, as well as their increasing influence on the legal economic activity.

Legislation related to *mafia* activities is not a unified *corpus* of laws. The diffusion, the strength and the danger of organized crime required big efforts from the legislator to enhance the cogency of crime deterrence and of investigations. There had been reforms that led to the approval of special laws, leading to a change in the way to settle sanctions and imprisonments. Every law approved was the response to some episodes, they did not have the purpose to be a peculiar part of Italian judicial system related to *mafia* crime.

Anti*mafia* legislation grew in the last part of twentieth century. The illegal phenomenon was already well established in Italy, but the policies to combat it were weak: it was not yet clear that Italian legislation

should internalize the aim of deter *mafia* type criminal associations.

The Law 27/12/1956 n. 1423 introduced *"Prevention measures for people dangerous for public safety and morality"*.

This Law did not contain the word *mafia*, but was one of the very first laws against *mafia* phenomenon. The Law established that people considered particularly dangerous could be relocated in different towns, towns in which should be difficult for them to carry out their illicit activity.

The Law targeted individuals dangerous for public safety and morality, individuals involved in criminal and illicit activities and individuals whose income were connected to illegal activity.

In 1965 the Legislator used the word *mafia* for the very first time. The Law 31/05/1965 n. 575 was the product of a twenty year effort of the *Commissione parlamentare d'inchiesta* on the *mafia* phenomenon in Sicily. The Law did not manage to give a specific normative definition of *mafia* association, but it managed to frame a criminological model of *mafia* association.

The art. 1 of the Law 31/05/1965 n. 575 established a measure of forced resettlement specific to people suspected of belonging to a *mafia* association, without giving a proper definition of *mafia* association; in fact, before 1982[11], the *mafia* type criminal organization was included in the definition of criminal association (*associazione a delinquere*) of the art. 416 of the Italian Penal Code:

> *When three or more people conspire to commit more crimes, those who promote or constitute or organize the association are punished for that reason alone, with imprisonment from three to seven years. By the mere fact of participating to the association, the penalty is imprisonment from one to five years. The penalty for heads is the same of the penalty for promoters. If the members are using guns, punishment is imprisonment from five to fifteen years. The penalty is increased if the number of members is ten or more.*

The Law 31/05/1965 n. 575 enlarged the potential recipients of the Law 27/12/1956, n. 1423, in fact also members of *mafia* associations could be under prevention measures. The *mafia* member had special forced resettlements, in fact, under special dangerous conditions the Questore or the National Director of Antimafia Prosecutions could ask to the court to move the dangerous person in a new municipality with specific territorial and safety characteristics.

4.1.1 *Mafia* type association

In 1982 things changed. Till 1982 was not possible to distinguish a small group of bank robbers from a well defined *mafia* type criminal organization. The Law 13/09/1982, n. 646, *Rognoni La Torre* was

[11] In 1982 with the Law 13/09/1982 n. 646, *Rognoni La Torre* was introducted the definition of *mafia* type criminal association.

approved by the Italian Parliament after the murders of the secretary of the Italian Communist Party (PCI), Pio La Torre, in Sicily and of the prefect of Palermo, the General Carlo Alberto Dalla Chiesa. The art. 1 of the Law 13/09/1982, n. 646, *Rognoni La Torre* introduced the art. 416-bis of the Italian Penal Code, which defined the *mafia* type criminal association:

> *The association has the adjective of mafiosa if it has as typical methodology to exploit the force of intimidation of the associative tie and of the condition of subjugation and silence (omertà) which derives from it, to acquire in direct or indirect way the management of economic activities, concessions, licenses, or to obstacle the free exercise of vote right, or to procure votes for themselves or others.*

The penalty for members of *mafia* tyme criminal associations was in between three or six years, there was also a penalty for the managers of the association and the penalty increased when the association used to be army. The art. 1 captures the methodology of Italian *mafia* as well as its infiltration in the official economy. The *mafia* association has become a crime in Italian Penal Code and it belongs to the section related to crimes against the public order. The art. 1 com. 7 of the Law 13/09/1982, n. 646, *Rognoni La Torre* established the expropriation of property rights of *mafiosi*, giving a well defined direction to the prevention measures of past laws:

> *It is compulsory the confiscation of properties of the defendant that were destined to commit the offense and of the things being the price, the product, the profit or which constitute the use.*

The Law refers to the confiscation of properties, we specify that the **confiscation** is the definitive expropriation of the good, the property is lost and no longer returned; the **seizure** is the step before **confiscation**, the property is not definitively lost, in fact, just after investigations the seized good can be confiscated or returned to the owner. The main aim was to undermine the economic power of *mafia* type criminal association, through the destruction of their heritage.
The art. 32 of Law 13/09/1982, n. 646, *Rognoni La Torre* established the *Commissione Parlamentare*, which had specific tasks:

- control the application of anti*mafia* laws;
- keep under control the adequacy of the legislation, especially in relation to the changes of the *mafia* phenomenon, introducing new proposals to keep more incisive the State initiative against the *mafia*;
- communicate with the Parliament once a year and when necessary.

4.1.2 Urgent provisions for the administration and destination of confiscated goods.

The D.L 14/06/1989 n. 230 completed the Law 13/09/1982, n. 646, *Rognoni La Torre*, introducing an administrator for seized and confiscated goods. The D.L. established that together with the seizure order, the court had to choose an administrator whose charge was to administrate and preserve the seized good. The administrator had to be chosen among the Registers of lawyers, legal attorneys and business consultant, but could also be chosen a person not in these categories, but with a great expertise in administration of confiscated goods.

The good had to be part of the State heritage, according to the art. 4 of the D.L 14/06/1989 n. 230. In case were confiscated real estates or firms, the good had to be evaluate and the Prefect had to propose a final destination. The purpose could consist of transferring the good to other public authorities, for free or under payment, keeping the good in the State heritage, or to sell it. The kind of purpose was based on the estimation of the State technical office.

The final destination had to be chosen by the Ministry of Finance, and it could be different from the purpose due to new information or general needs.

The D. L.08/06/1992 n. 306 established that the confiscation was always implemented if the convicted could not justify the origin of the good at his disposal or of the good in his property, and if the value of the good resulted unbalanced with respect to the revenue of the convicted.

The imbalance between the economic capacity delcared by the convicted and his effective disposal became a signal for capture the illicit origin of the good.

4.1.3 Commissariamenti: City council dismissals: Taurianova episode

Since 1982, laws aimed to punish just *mafia* criminals, without any concern about outsider contributors. Things changed in 1991, when was clear the link between *mafia* organizations and some figures of Italian politics.

Before 1991, the art. 15 of Italian Penal Code ensured the suspension of local administrators in case they were under penal trial regarding the art. 416-bis of Italian Penal Code. The D.L. 31 May 1991 n. 164 (converted in Law on 22 July 1991) introduces the art. 15-bis which requires the dismissal of the entire council even in case of one administrator being in a relationship with the *mafia*.

The Italian Law regarding council city dismissal has been developed after a bloody mafia related murder in a very small Italian municipality, Taurianova. After this brutal episode, the Taurianova council was dismissed and substitute by government special commissioners.

On 2 May of 1991, Rocco Zagari, a boss in Taurianova, while he was in a barbershop, was murdered with other four people. One of these was beheaded.

After that episode, the whole public opinion attention was captured and focused on the brutal murder.
The city council dismissal advantage is its simplicity, it does not require uncontestable proofs of illegal connections; the law allows the city council dismissal for things like: absence of regulatory plans, policy services inefficiency, bad administration of schools, streets, and cemeteries, corrupted tenders and so on.
It is not necessary a material proof, but circumstances elements.
We can assess that the real causes of a dismissal can be discretionary and not objective. The most frequent reasons documented are:

- connections, affinities, and friendship between administration members and *mafiosi*;
- cases in which one or more administrators have pending penal procedures relatively to connections with the organized crime;
- cases of votes that have been extorted, cases in which votes have been paid and been in an exchange, also cases in which the second ballet has seen a huge movement of votes;
- attacks and threats that can influence political subjects;
- the infiltration in the construction industry and tenders.

The dismissal procedure, usually, starts with the investigations of the Police, if they find some evidence, the Prefect is warned.
The Prefect carries on other investigations, sends its results to the Intern Ministery of Interior, who evaluates the possibility of dissolution of the council.
The President of Republic, to the end of the procedure, announces the dismissal.
A technocratic caretaker government sobstitutes the dismissed government.
The technocratic caretaker government consists of three commissioners nominated by the Ministry of Interior (generally high-level bureaucrats), who will govern the municipality for a period of 12 to 24 months.
Subsequently, local elections will be organized, and a new municipal government can take charge. The inauguration of this new government, naturally, also brings about the discharge of the commissioners.
Elections are held every five years and citizens directly vote for their councilors and the mayor. The mayor, head of *Consiglio* and *Giunta*, after elections, decides a certain number of aldermen (*assessori*), according to the population size.
Local elections, are effectively quasi randomly distributed across municipalities in a five year cycle, because they do not occur simultaneously in all the Counrty.
In fact, it can happen that administrations do not always last five years, also because of dismissals,

often not related to *mafia* infiltrations. Municipal councils have important powers in terms of local taxes (particularly taxes on property) and the provision of public goods (for instance, culture and recreation, transport, economic development, education, garbage management, local police and social welfare).

4.1.4 Provisions for the administration and destination of confiscated goods.

The Law 07/03/1996 n. 109 simplified the procedure of the destination and of the reuse of goods confiscated from the *mafia* type criminal associations.
The Law clarified the wish of the legislator of destiny the confiscated goods to the public utility. The real properties could be:

- maintained in the State heritage for purposes of public order, justice and civil protection;
- transferred to the local government heritage for social purposes.

Firms could be maintained in the State heritage and destined to:

- rent, in case was clear the possibility to continue or to recovery the productive activity, subject to assessment by the competent office of the territory of Ministry of Finance;
- sale, in case of utility for the public interest;
- liquidation;
- the redevelopment of urban areas, the recovery from alienation and the promotion of culture and legality.

4.1.5 Rotation fund for supporting victims of *mafia* crimes.

The Law 22/12/1999 n. 512 instituted the Rotation fund for supporting victims of *mafia* crimes, the State furnished twenty billion lira per year and the Found was incorporated with the found for victims of extortion and usury. Moreover, the found was also increased with money unused in the administration of confiscated goods, and with money earned from the sale of confiscated properties and from the liquidation of firm assets.

4.1.6 Unique justice found

The Unique justice found was instituted with the D.L. 25/06/2008 n. 112, the aim was to avoid the dispersion of money and bonds derived, among other things, from seizure and confiscation of goods. The aims of the Found were:

- centralize the system of administration and collection of seized and confiscated money and bonds;
- yield returns from these assets when possible;
- use the money of seized or confiscated goods, because even if the seizure can be revoked and the money returned to the owner, the money can be used during the procedure.

4.1.7 Register of legal administrator

The D.L. 04/02/2010 n. 14 instituted the Register, composed of experts chosen in the Registers of lawyers, business consultant and other professional figures. The Register members could not be connected to criminal activity or to the convicted person.

> "*People signed in the Register of legal administrator had in charge to administrate and preserve the seized good.*"

4.1.8 *Agenzia Nazionale dei Beni Sequestrati e Confiscati alla Criminalità Organizzata* (ANBSC)

The D.L. 04/02/2010 n. 4 instituted the *Agenzia Nazionale dei Beni Sequestrati e Confiscati alla Criminalità Organizzata*, it was an authority under the vigilance of the Ministery of Interior. The art. 1 established the ANBSC tasks:

- collect information about seized and confiscated goods from the *mafia* type criminal associations during prevention or penal procedures;
- collect information about the conditions of seizure and confiscation procedures;
- verify the condition of the goods, ensuring the consistency, the destination and the reuse of the goods;
- program the distribution and the destination of confiscated goods, analysing acquired data and express judgement about assignment and destination;
- support the judicial authority in administration and preservation of confiscated goods;
- administrate goods after the conclusion of the preliminary judicial hearing;
- implement decisions to achieve the opportune assignment and destination of the goods, where necessary also nominating a *commissario ad acta*.

We analysed the legislation in the Italian system related to *mafia* type criminal associations and their connection with the legal economic activity. The laws implemented were a clear signal that was necessary a more systematic approach to combat the *mafia* phenomenon, in particular was finally recognized the importance of centring one of the pillars of *mafia*: economic power. The legislation about patrimonial prevention measures referred to *mafia* type criminal organizations moved from the belief that a *mafia* person without its properties is as a king without a kingdom. [12]

4.2 D.L. Il Codice delle leggi antimafia e delle misure di prevenzione

The D.L. 06/09/2011, n. 519, named "Codice delle leggi antimafia e delle misure di prevenzione, nonchè nuove disposizioni in materia di documentazione antimafia" aimed to reorder the entire world of prevention measures, seizure, confiscation and destination proceedings. The Code was commissioned with the Law 13/08/2010 n. 136 named "Piano straordinario contro la mafia, nonchè delega al governo in meteria di normativa antimafia": the Government was in charge of writing the Code containing prevention measures and anti*mafia* laws. The Government aimed at the harmonization and coordination of anti*mafia* laws, one of the specific goals was simplifying the legislation.
The Code is still in force nowadays, even after some changes. The code presents four books, they are divided as:

- Book I: Prevention measures;
- Book II: New dispositions for anti*mafia* laws;
- Book III: Investigative and informative activities in the struggle against criminal organizations, *Agenzia nazionale per l'amministrazione e la destinazione dei beni confiscati alla criminalitá organizzata*;
- Book IV: Modifications of Penal Code, Procedural Penal Code and penal legislation. Abrogations. Temporary and coordination dispositions.

4.2.1 Personal prevention measures

Personal prevention measures are regulated in the first Title of first Book. Personal prevention measures are addressed to dangerous individuals that are involved in criminal activities or that live of the profits of the same criminal activities or that are anyway used to commit crimes.
Personal prevention measures can be applied by the police commissioner or by the judicial authority. Those applied by the judicial authority can also be addressed to individuals suspected of belonging to

[12] Commissione Parlamentare Antimafia, 1994

mafia-type criminal associations, according to the art. 416-bis of Penal Code. The defendant can be forced to move back to his original municipality in case this individual is suspected to be dangerous for the public safety. The individual can be warned to behave honestly. The commissioner can forbid the individual definitively sentenced to use any vehicle, communication tool and other thing outside the control of the police.
Independently on the type of prevention measure considered, the court orders to live honestly, to respect laws and to distance from convicted people or people under prevention measures.

4.2.2 Property prevention measures

The second Title of the first Book introduces property prevention measures, clarifying and reorganizing the regulation about seizure and confiscation. Property prevention measures are addressed to the same individuals targeted by the personal prevention measures.

Seizure The art. 20 of the D.L. 06/09/2011 n. 519, *Codice antimafia* establishes that the court can use a justified administrative order to seizure the goods at the disposal (or in the property) of the individual under prevention measure.
The seizure can be implemented when the value of the goods results unbalanced with respect to the income declared by the individual or with respect to the economic activity conducted by the individual; to seize the good is, moreover, sufficient that it is the product or the tool of an illegal activity.
The seizure can be annulled, this happens when the proposal of the prevention measure is rejected or when it is shown that the good is the product of legal activities or in cases in which the good is not available to the convicted individual.
The seizure is executed by the judicial officer, he takes materially the good and introduces it at the compulsory administration by the legal administrator. The administrator gets the possession of the good with the help of judicial police. If there is the danger that the good can be stolen, the seizure can occur before the judicial hearing.

Confiscation The art. 24 of the D.L. 06/09/2011 n. 519, *Codice antimafia*, establishes that the confiscation is a conclusive measure. The court establishes the confiscation of the goods when the convicted individual is not able to explain the legal origin of the goods or if the good is owned by a frontman but is at the disposal of the convicted individual and the good does not reflect his financial resources or if the good is the product or the tool of an illegal activity.
The confiscation decree can be issued within 18 months after the good went under the ownership of the legal administrator.

It is possible to appeal against the confiscation decree, the confiscation looses enforcement power if the Court of Appeal does not give a sentence within 18 months. The confiscation can be revoked as the seizure, but since it is a conclusive measure, some conditions must be attained:

- new proofs must show up after the end of the procedure;
- new facts must show up after the confiscation, invalidating the premise of the confiscation application;
- the confiscation was entirely based on false premises.

Preventive seizure and confiscation can be issued also relatively to goods already under seizure for a penal procedure.
If the prevention confiscation occurs before the definitive penal conviction sentence, the good has to be anyway assigned and destined. When, subsequently, the judge establishes the confiscation in the penal procedure, he declares that it has already been executed during the prevention procedure. While, when the judge established the confiscation in the penal procedure, the court declares that the confiscation has already been executed during the penal procedure.

4.2.3 Administration and management of confiscated and seized goods

The administration The Code establishes that concomitantly with the seizure measure issued by the court, the judge has to elect a legal administrator. The administrator is chosen within the Register of legal administrators, he has to fulfil his tasks with the diligence conform to his position.
The convicted individual cannot be a legal administrator, as well as his relatives and cohabitants.
The administrator has to prepare a report for the judge in which he describes the state of the goods, their market value and the right of others on the same good, within thirty days if a good is seized or within six months if a firm is seized.
In case a firm is seized, the administrator has to detect the differences between inventory and accounting and at the same time has to exploit ways to recover the business activity of the firm.
The *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata* assists the legal administrator, under the direction of the judge, until the first degree of confiscation. The *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata* has the possibility to ask the annulment or the modification of the administration procedures when there is the risk that the destination or the assignment can be compromised.
After the first degree of confiscation, the administration of the good passes to the *Agenzia nazionale per*

i beni sequestrati e confiscati alla criminalità organizzata that can choose the help of the former legal administrator or of another expert. The good has always to be monitored.

The management of seized goods The judge provides general guidelines on the management of seized goods, listening the *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata* opinions.
The good is under the custody of the legal administrator till the first decree of confiscation, if it is a property it is exempt from taxes and costs till its destination decree, if it is an object that can be subject to degrade, the good can be sold after thirty days from the report of the legal administrator or of the *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata.* If the good is objectively unprofitable the court can issue the demolition.

The management of firms Till now we did not distinguish among goods, but it is important, at least, to differentiate "goods" from "firms".
The management of a firm is a complex environment, in fact the legal administrator has to be an expert of the Register and has to express detailed opinions about the possibility of continuing the economic activity of the firm.
The firm is under the custody of the legal administrator from the seizure to the first degree of confiscation, then, from the first degree of confiscation to the destination, the firm is under the custody of the *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata.* The legal administrator has to deal with ordinary administration deeds, necessary for the life of the firm, the judge establishes the entity of the value of ordinary administration deeds.
In case majority shares are seized, the judge can choose to substitute the society managers or to contest the deliberations that can damage the legal administration.

4.2.4 The destination of confiscated goods

The art. 45 of the D.L. 06/09/2011 n. 519, *Codice antimafia* establishes that:

> *After the definitive preventive confiscation the goods are included in the State heritage free from duties.*

Destination of goods The *Agenzia nazionale per i beni sequestrati e confiscati alla criminalità organizzata* puts confiscated amount of money and money derived from the sale of confiscated goods in the Unique Justice Found, but just in case these sums are not destined to help victims of *mafia* crimes.
Properties are maintained in the State heritage for purposes of public order or are transferred to local

governments, for free or under payment, always maintaining as aim the protection of social welfare. The crucial aim of destinations is to preserve and eventually increase social welfare.

Destination of firms Firms are included in the State heritage and are destined with a decree issued by the *Agenzia nazionale per i beni sequestrati e confiscati alla criminalitá organizzata.*
Destinations of firms can be different:

- rent, in case was clear the possibility to continue or to recovery the productive activity. The firm can be rented for a fee to societies and to public or private companies, or free of charge, without charges to the State, to cooperatives of employees of the confiscated company. In choosing the tenant, solutions that guarantee employment levels are preferred. The firm cannot be rented by the cooperatives of employees of the confiscated company if one of its partners is a relative, partner, similar or cohabiting with the recipient of the prevention measure;
- sale, in case of utility for the public interest or for indemnifying victims of *mafia* crimes;
- liquidation, always in case of public interest or for indemnifying victims of *mafia* crimes.

5 Previous evidence on *confiscated firms*

5.1 *Mafia* firms and aftermaths

In the paper "*Mafia* firms and aftermaths", Alfano et al. (2019) use a definition of *mafia* firm inspired by the Law 13/09/1982 n. 646, *Rognoni La Torre*, even if they consider *mafia* firms just confiscated firms that after a trial are allocated to other uses. Alfano et al. (2019) try to investigate the tools used by the *mafia* to expand its firms. *Mafia* firms are in fact considered as activities used by criminal organizations to leak in legal activities. Legal activities are able to ensure long lasting profits, associated with a lower probability of conviction, while illegal activities may be highly rewarding, but with a higher probability of conviction.
In the paper are considered three hypothesis and tested with three models. The hypothesis are:

- *Mafia* firm's market power increases with the number of *mafia* firms operating in local markets;
- *Mafia* firms prefer political corruption to violence to build up and maintain market power, but they use the latter if the former is not effective to the scope;
- The impact of the *mafia* firms on the economy depends on the aim they pursue. If they pursue an increase in market power, there will be detrimental effects on the economy. If their aim is money laundering, the effects of *mafia* firms on the economy may be beneficial.

In the first model Alfano et al. (2019) try to estimate the determinants of *mafia* firms in each province or region, they regress the number of *mafia* firms over the total number of firms in a jurisdiction at time t on a set of variables at time $t-1$: the variable dismissed, indicating the number of municipalities dismissed over the total number of municipalities, this variable represents corruption in the public sector and institutional corruption; on the variable crime, indicating the number of *mafia* related crimes committed by people in a jurisdiction per thousand inhabitants, this variable represents the violence used by the *mafia*; on the variable indicating the interaction between crime and dismissed, this variable represents the use done by the *mafia* of corruption and violence, the sign indicates if they are complementary, positive sign, or substitute tools, negative sign; on the variable non performing loans, indicating the non performing loans of bank customers in the jurisdiction, this variable captures the environmental characteristics and the condition of firms in the jurisdiction; on the variable kg of waste per capita in a jurisdiction, this variable represents compliance with the law in the jurisdiction; on the variable justice efficiency, indicating the average duration of criminal proceedings; on the variable unemployed, indicating the unemployment rate in the jurisdiction; on the variable value added pro capita in a jurisdiction.

$$\begin{aligned} MF_{i,t} &= \alpha_0 + \alpha_1 Diss_{i,t-1} + \alpha_2 Crime_{i,t-1} + \alpha_3 Diss_{i,t-1} * Crime_{i,t-1} + \alpha_4 NPloans_{i,t-1} \\ &+\alpha_5 Kgwastes_{i,t-1} + \alpha_6 Justeff_{i,t-1} + \alpha_7 Unempl_{i,t-1} + \alpha_8 Vapc_{i,t-1} + \epsilon_{i,t} \end{aligned} \tag{34}$$

The results of this model when the unit of analysis is the region can be summarized as follows: dissolved municipalities are always positively significant in determining the share of *mafia* firms in the region; the negative sign of the coefficient of the interaction term, significant at 1 per cent level, indicates that crime and political corruption are considered alternative tools to pursue market power in local markets; higher unemployment rate and non performing loans in the region boost diffusion of *mafia* firms, their coefficients are all positive and significant at 5 per cent level, for every specification of the model; the non significance of the value added per capita indicates that the diffusion of *mafia* firms is not a prerogative of less developed Italian regions.

The second model is a dynamic panel data model estimated using Arellano-Bond panel data technique with cluster robust standard errors, Alfano et al. (2019) regress the percentage variation of firms over the population in each jurisdiction (EMF) on the first lag of the dependent variable and on all the other variables present in the first model. The percentage variation used as dependent variable reflects more the dynamics of *mafia* firms' entry and exit in a territory.

$$\begin{aligned} EMF_{i,t} &= \alpha_0 + \alpha_1 EMF_{i,t-1} + \alpha_2 Diss_{i,t-1} + \alpha_3 Crime_{i,t-1} + \alpha_4 Diss_{i,t-1} * Crime_{i,t-1} \\ &+\alpha_5 NPloans_{i,t-1} + \alpha_6 Kgwastes_{i,t-1} + \alpha_7 Justeff_{i,t-1} + \alpha_8 Unempl_{i,t-1} + \alpha_9 Vapc_{i,t-1} + \epsilon_{i,t} \end{aligned} \tag{35}$$

The results of this model, when the unit of analysis is the region, confirm the importance of the role of political corruption to expand *mafia* firms: coefficient of dismissals is positive and significant for any

specification of the model; non performing loans and unemployment are not significant determinants of the change in the number of *mafia* firms in the subsequent years.

To get more insights in these results, Alfano et al. (2019) split the sample in Centre-North and South, the main differences in these two areas rest in the level of development, in the efficiency of the judicial system and the public sector, in the density of criminal organizations, even if in the last decades Centre-North regions have experienced higher *mafia* infiltration rate.

The results suggest that in the Centre-North crime has a positive significant impact on *mafia* firms, while in the South is never significant, for each model specification; oppositely political corruption has a significant and positive effect on *mafia* firms in Southern regions, while in the Centre-North is not significant or has a negative impact. These results lead to think that in regions in which *mafia* is well established, it uses corruption, while in other regions it builds a reputation using violence.

Subsequently Alfano et al. (2019) investigate the impact of *mafia* firms on different dependent variables: (i) entrepreneurship, (ii) unemployment, (iii) migration, using the following model:

$$\begin{aligned} Y_{i,t} &= \alpha_0 + \alpha_1 Y_{i,t-1} + \alpha_2 Y_{i,t-2} + \alpha_3 Lfirms_{i,t-2} + \alpha_4 MF_{i,t-2} + \alpha_5 Crime_{i,t-2} \\ &+ \alpha_6 Publicexpenditure_{i,t-1} + \alpha_7 Unempl_{i,t-2} + \alpha_8 Vapc_{i,t-2} + \epsilon_{i,t} \end{aligned} \tag{36}$$

Lfirms is a variable indicating the natural logarithm of the number of active firms in the jurisdiction, the variable *Publicexpenditure* indicates the public expenditure in the jurisdiction. The results suggest that an increase in *mafia* firms in the region has detrimental effects for entrepreneurial activity, the coefficient is negative and significant at 1 per cent, at the same time an increase in *mafia* firms reduces unemployment and migration rates in the region. This seems to lead to the conclusion that an increase in *mafia* firms has detrimental effects on economic activity but beneficial social effects. These unintuitive results may rely on the fact that during the crisis, which is embedded in the sample period analysed (2004-2016), the economic possibilities given by criminal organizations muffled the blow of the economic crisis: people had the possibility to switch from legal to illegal activities. In conclusion, the paper tries to capture the determinants of *mafia* firms, both in areas where criminal organizations are well rooted and in areas where criminal organizations are expanding in the last decades. In both areas political corruption is the fundamental determinant of *mafia* firm expansion. Criminal organizations switch to violence when corruption reveals ineffective to reach their goals. In addition, the *mafia* uses violence to build a reputation in new established regions. In the South *mafia* firms are boosted by unemployment and inability of borrowers to repay their debts. On a macroeconomic prospective *mafia* firms have ambiguous consequences: *mafia* firms hamper entrepreneurial activities and displace competitors, while they also decrease unemployment and migration rate, softening the effects of the crisis.

5.2 Organized crime and firms: evidence from Italy

In the paper "Organized crime and firms: evidence from Italy", Slutzky and Zeume (n.d.) study the effect of organized crime on firms. Slutzky and Zeume (n.d.) overcome the main problem in studying this effect: organized crime is largely unobserved. They, in fact, exploit a quasiexperimental design that provides a plausibly exogenous shocks to the power of the *mafia*. They study municipality and firm level outcome exploiting anti*mafia* enforcement actions in Italy over the 1995-2015 period. Enforcement actions imply that *mafia* assets are confiscated by the government in the attempt of reducing *mafia* resources and weakening its reputation. More specifically, Slutzky and Zeume (n.d.) use staggered anti*mafia* enforcement actions across municipalities in Italy in the form of asset confiscations. They collect data provided by the ANBSC on the date, location (municipality), and number of assets confiscated from the *mafia*. Their analysis bears on assets that have been redeployed, those reused for social purposes, since, for undisposed assets, confiscation dates are unavailable. However, they mitigate the concern that their confiscation measure might be biased by redeployments rates looking at the high correlation of the geographical distribution of the deployed assets and assets confiscated but not yet redeployed.

Slutzky and Zeume (n.d.) define two variables to capture the weakening of local *mafia* families: Confiscation Dummy that takes the value of one following the first confiscation at the municipality level; Confiscations that is the natural logarithm of one plus the accumulated number of asset confiscations at the municipality level at any point in time. Slutzky and Zeume (n.d.) found information on competition and firm-level data, for all Italian public and private firms, in Bureau Van Dijk's Orbis database.

They exploit incorporation years and information on firms' disappearance (by declaring bankruptcy or being dissolved), to construct three measures of competition at the municipality-year level: Turnover Rate, Entry Rate, and Exit Rate. Turnover Rate is defined as the number of new firms that enter plus the number of firms that cease to exist scaled by the number of active firms at the beginning of a given year, Entry rate and exit rate are defined as the number of new firms created and the number of firms that cease to exist over a given year, respectively, each one scaled by the number of active firms at the beginning of the year.

At the firm level, Slutzky and Zeume (n.d.) use Revenues and Assets to capture size. Employee productivity is measured by Revenue per employee (revenues divided by number of employees), and profitability by Return on assets (after-tax profit divided by assets).

Slutzky and Zeume (n.d.) estimate the effect of anti*mafia* enforcement actions on firm turnover, entry, and exit using a difference-in-difference approach, they use as dependent variable Confiscation Dummy and control for Confiscations to measure the effect of the intensity of asset confiscations, moreover they also control for municipality fixed effects and province-year fixed effects. This model is aimed at studying

whether the *mafia* in a municipality acts as a barrier to entry for new firms and protects existing firms. More specifically, they test whether anti*mafia* enforcement actions lead to an increase in competition. Results show that for an increase of 1 percent in the number of confiscated assets, there is an increase in the turnover rate of 0.65 percent. This result can be decomposed into entry and exit rates, moreover most of the effect comes from entry.

Next, they examine whether organized crime benefits firms under its protection. In particular, Slutzky and Zeume (n.d.) test whether anti*mafia* enforcement actions negatively impact incumbent firms. Slutzky and Zeume (n.d.) implement a difference-in-difference specification to estimate the effect of asset seizures on firm-level outcome, they use as dependent variable Confiscation Dummy to indicate the anti*mafia* enforcement actions, they also control for firm fixed effects and province-time fixed effects. They find that firms affected by anti*mafia* enforcement actions experience a 4.2 percent decline in revenue. The assets of affected firms decline by 1.4 percent on average.

Moreover, Slutzky and Zeume (n.d.) examine whether anti*mafia* enforcement actions affect employee productivity, as measured by revenue per employee. Results show that employee productivity declines: revenue per employee declines by 1.6 percent; ROA declines by 0.1 percent, but is statistically insignificant. Including in the analysis the intensity of anti*mafia* enforcement actions leads to stronger results: additional declines in size, in revenue per employee, and in employee profitability.

Slutzky and Zeume (n.d.) claim that results are in line with the idea that firms under *mafia* protection may charge oligopolistic prices, and support the idea that the costs of the protection outweigh its benefits, moreover anti*mafia* enforcement actions destroy some of the benefits enjoyed by incumbent firms.

In conclusion, the paper exploits anti*mafia* enforcement actions over the 1995-2015 period in Italy to study the effect of organized crime on firms. At the municipality level, Slutzky and Zeume (n.d.) find that as the influence of organized crime weakens competition among firms. At the firm level, firms that do not exit in response to anti*mafia* enforcement actions shrink in size and experience a decline in employee productivity, as well as a slight reduction in profitability. These results are more pronounced for firms that are treated by multiple anti*mafia* enforcement actions.

6 The empirical design

In this essay we contribute evidence on the effects of competition on markups and labour share, relying on a quasi-experiment. The quasi-experiment we are going to investigate relies on the so-called prevention measures—seizure, confiscation—of properties, belonging to individuals already subjected to personal prevention measures. Thus, we exploit measures of plausibly exogenous variations in the degree of market competition at a local level, by exploiting an Italian law.

We already discussed this Italian law in the previous section, thus here we briefly highlight the main characteristics of the institutional setting which we exploit for the purpose of our research and the peculiarities this setting has in order to make us confident about talking of a quasi-random change in the degree of competition.

Personal prevention measures are employed to track dangerous individuals involved in criminal activities or that are anyway used to commit crimes; they can be applied by the police commissioner or by the judicial authority. Those applied by the judicial authority can also be addressed to individuals suspected of belonging to *mafia*-type criminal associations, according to the art. 416-bis of Penal Code. Property prevention measures are seizure or confiscation; they involve any property belonging to individuals involved in personal prevention measures.

Seizure—chronologically the first property prevention measures—requires the suspicious that the property is the outcome or the tool of an illegal activity; confiscation takes place if during a trial the defendant is not able to prove the legal origin of his property. In this research, property prevention measures are exploited as an exogenous shock to the number of firms in a local market.

It can happen however, that preventive seizure and confiscation can be also arranged in relation to assets already seized in a criminal proceedings.

This institutional setting sheds light on our purpose of quasi-randomness of the shock to firms under prevention measure, in fact these firms cannot be identified as being illegal economic activities, they are just companies in the property or at the disposal of an individual under prevention measures. Moreover, we want to stress the concept that seized or confiscated firms are firms operating legally in the local economic activity. They experience these compulsory measures exclusively because they are in the property or at the disposal of an individual somehow involved in criminal activities or an individual involved in a relationship with figures belonging to a *mafia* type criminal organization according to the art. 416-bis of Penal Code. We sustain the quasi-randomness of firms' destruction shock aware of the fact that we are not taking in consideration firms that can be labelled as '*mafia*-firms'. We focus on firms that do not operate in a sub-legal contest and, more important, they are not confiscated because they are infiltrated by the *mafia*. No concern of self selection can arise due to a potential correlation between the shock of our interest and state of competition.

The fact that firms under our analysis are alien to pure *mafia* activity is clear from the main aim of the authority (ANBSC) responsible to discipline the destination process, the final step of the firm after having experienced seizure, confiscation and compulsory administration. The aim is to fully preserve employment levels and the economic activity, in line with the Law, art. 48 of the D.L. 06/09/2011 n. 519, Codice anti*mafia*.

Aside from the final destination of the firm, we investigate as measure of firm's exit shock, the break-down to the normal economic activity of the firm. In fact, after the seizure the firm is managed by an administrator, assisted by (ANBSC),[13] she faces several problems that interfere with the actual economic presence of the firm into the market:

- the Law precludes the possibility of renting the firm before the destination, creating difficulties for the administrator that does not have the disposal of resources to face the management and the maintenance of the firms;
- the administrator gets the assignment following the adoption of the court of his report on the business prospects of the firm. This process takes at least six months, creating a crucial gap in time that compromises firms' chance to be re-inserted in the market;
- the administrator acts cannot go beyond ordinary administration, implying the risk of a slow and ineffective management.[14]

Case study, Suvignano estate The complex story of this firm begins with the judge Giovanni Falcone, who seized the company for the first time to the Sicilian entrepreneur Vincenzo Piazza in 1983, suspected of being in touch with *Cosa Nostra mafia*-organization. Vincenzo Piazza regained the property of the estate, but investigations continued. After the arrest of Piazza for *mafia*-association, the Sicilian magistrates set up a new seizure. The farmhouse had been under compulsory administration since 1993. Only in 2007, when the sentence of Piazza became definitive, all its assets were confiscated, and, among these, also Suvignano. Since 1993 Suvignano administration has not pursued economic activity. In 2018 Suvignano estate has been destined to the property of the local government and is exercising economic activity.[15]

6.1 The empirical approach

6.1.1 Measuring profitability

Huge attention has been placed on the estimation of markups, not just from economists. Policy makers, for example, have been focused on understanding the impact of competition and trade policies on market power. Industrial organization economists have to deal with the common issue of data availability in this field, for example the absence of readily information on marginal cost, but also on price level and quantity sold.

[13]The Code establishes that concomitantly with seizure measure issued by the court, the judge has to elect a legal administrator.

[14]Beni sequestrati e confiscati alla criminalità organizzata: disciplina, criticità e proposte, Fondazione del Monte.

[15]Repubblica Cronaca: Agriturismo Suvignano

Usual approaches to measure markups in modern industrial organization make assumption on a particular demand system and on firm competition, the former delivers price elasticity of demand and combined with the latter leads to markups through the first order condition of optimal pricing.

These approaches have some limitations: imposing a framework to the competition can be misleading especially when you deal with a very large number of heterogeneous firms operating in different industries, moreover using a particular demand system leads to ignore the heterogeneity across products, imposing a unique demand for all of them. These approaches are also subjected to the common problem of data availability in industrial organization, in fact to estimate price elasticity of demand would be necessary information about prices and quantities for a large set of sectors and a useful period of time. (De Loecker and Eeckhout, 2017)

Hall (1986) suggested a way to compute markups based on an underlying model of firm behaviour, the approach leads to an aggregate markup using the notion that under imperfect competition input growth is associated with disproportional output growth, measured by the relevant markup. Hall (1986) paper lays the foundation for subsequent literature based on the flair that markups could be recovered using information on inputs and total value of shipments.(Domowitz et al., 1988; Waldmann, 1991; Morrison, 1992; Norrbin, 1993; Roeger, 1995; Basu and Fernald, 1997; Klette and Griliches, 1996)

Hall (1986) approach builts the basis for the De Loecker and Warzynski (2012) approach, which we are going to discuss in this section.

The approach is crucially linked to optimal input demand obtained from the first order condition of the cost minimization problem and to the possibility to identify the output elasticity of a variable input free of adjustment costs. The methodology relies on the insight that in conditions of perfect competition (price equals marginal cost of production), the output elasticity of a variable factor of production is exclusively equal to its expenditure share in total revenue. Whenever imperfect competition occurs the markup is recovered in the distance between input's revenue share and output elasticity.

Still some issues must be addressed, the key problems related to the estimation of output elasticity: simultaneity bias, due to endogeneity of inputs, and selection bias, due to the exit of firms with significant negative productivity shocks. To be more general the issue lies in the threat to the identification of output elasticity due to the potential correlation between input choice and productivity. Various branches of literature have tried to address this issue, with instrumental variables or GMM approach, while De Loecker and Warzynski (2012) rely on the proxy methods advanced by Olley and Pakes (1992); Levinsohn and Petrin (2003); Ackerberg et al. (2006). Olley and Pakes (1992) show how to use investment to control for correlation between input levels and the unobserved firm-specific productivity process; Levinsohn and Petrin (2003) show how intermediate inputs (those inputs which are typically subtracted out in a value-

added production function) can also solve this simultaneity problem; Ackerberg et al. (2006) introduce as source of independent variance a variable z that impacts firm's choice labour but not investment choice (an unobserved and unanticipated shock to the price of labor that occurs between two points in time), in order to avoid identification issues due to the collinearity between labour and a non parametric function used throughout the estimation in OP and LP.

De Loecker and Warzynski (2012) propose an empirical model to rely on standard cost minimization conditions for variable inputs free of adjustment costs. The condition links the output elasticity of an input to the share of that input's expenditure on total sales and the firm's markup. This approaches is also close to Basu and Fernald (2002); Petrin and Sivadasan (2013). They highlight the flexibility of their approach with respect to the underlying production technology, consumer demand and market structure. The key point of the theory brought in light by De Loecker and Warzynski (2012) is to just consider the optimizing problem of cost minimizer firm; no assumptions on demand or firm competition is needed, just information on firm's financial statement. To the purpose of our analysis we calculate markups following De Loecker and Warzynski (2012) and De Loecker and Eeckhout (2017). Consider an economy with N firms, indexed by $i = 1, ..., N$. Firms are heterogeneous in their productivity and otherwise have access to a production technology $Q_{it}(.)$. In each period t firm i maximizes the contemporaneous cost of production given the production function that trasforms input into quantity of output Q_{it}, produced by the technology $Q_{it}(.)$. A firm i produces output Q at time t using the following production technology:

$$Q_{it} = Q_{it}(X_{it}^1, ..., X_{it}^V, K_{it}, \omega_{it}) \tag{37}$$

two kind of inputs are considered:

- a vector of variable inputs for production whose optimization can be solved statically: V variable inputs, such as labour, intermediate inputs, materials;
- a dynamic input of production: capital stock, K_{it}, which is treated as a dynamic input in production.

The Hicks-neutral productivity term, that is firm specific, is denoted with ω_{it}. The unique restriction imposed on $Q(.)$ to derive an expression of markup is that $Q(.)$ is continuous and twice differentiable with respect to its arguments.

The next assumption is that producers active in the market are cost minimizers. Given this assumptions, the estimation of markups relies on the optimal input choice of the firm. Capital is a dynamic input that requires adjustment costs. Labour can be considered as a variable input, but often subject to specific regulations and constrains. Intermediate materials are a variable argument of $Q(.)$. The key assumption will be that within one period (a year in the data), variable inputs frictionlessly adjust, whereas capital

is subject to adjustment cost and other frictions. We can consider the associated Lagrangian function:

$$\mathscr{L}(X_{it}^1, ..., X_{it}^V, K_{it}, \lambda_{it}) = \sum_{v=1}^{V} P_{it}^{X^V} X_{it}^V + r_{it} K_{it} + F_{it} + \lambda_{it}[Q_{it} - \bar{Q}_{it}] \tag{38}$$

where $P_{it}^{X^V}$ and r_{it} represent respectively firm's input price of a variable input v and of capital; F_{it} is fixed cost, $Q_{it}(.)$ is the technology specified, $\bar{Q}_{it}$ is a scalar and λ_{it} is the Lagrangian multiplier. Thus the composition of the functions is made of the expenditure of all variable and dynamic inputs and the technology constraint.

First-order condition for any variable input free of any adjustment costs is given by:

$$\frac{d\mathscr{L}_{it}}{dX_{it}^v} = P_{it}^{X^v} - \lambda_{it} \frac{dQ_{it}(.)}{dX_{it}^v} = 0 \tag{39}$$

an important assumption laying in the FOC is that input prices are given to the firm, this does not preclude the possibility that the input seller charges a markup on the input sold, potentially driving a double-marginalization. From the condition $\frac{d\mathscr{L}_{it}}{dQ_{it}} = \lambda_{it}$ we obtain the parameter λ_{it} which indicates the change in the objective function if the firm is allowed to relax its constraint (production) of one unit: λ_{it} represents the marginal cost of production at a given level of output. Rearranging terms and multiplying both sides by $\frac{X_{it}}{Q_{it}}$ yields to:

$$\frac{dQ_{it}(.)}{dX_{it}^v} \frac{X_{it}^v}{Q_{it}} = \frac{1}{\lambda_{it}} \frac{P_{it}^{X^v} X_{it}^v}{Q_{it}} \tag{40}$$

cost minimization implies that optimal input demand is satisfied when a firm equalizes the output elasticity to any variable input X_{it} to $\frac{1}{\lambda_{it}} \frac{P_{it} X_{it}}{Q_{it}}$. It is important to stress the above conditions on the use of dynamic inputs of production such as capital, and potentially other inputs facing adjustment costs. It is the use of this *conditional cost function* that will allow us to uncover a firm's markup, as cost minimization implies that we can simply condition on the dynamic inputs of production and therefore not have to consider the full dynamic problem of the firm and avoid having to make additional assumptions.

A final step to obtain an expression for the markup μ_{it} is to simply define it as $\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}$, where P_{it} is firm's output price. This expression is robust to various (static) price setting models, and does not depend on any particular form of price competition among firms. One restriction imposed on price setting is that prices are set period by period, and hereby rules out dynamics in pricing such as menu pricing or simply costly adjustment of changing prices. It is important to realize that we identify the markup from the difference in price and marginal cost. Markups are determined in equilibrium, however, depending on the specific model of competition and strategic interaction between firms. For our purpose it is sufficient to define the markup μ_{it} as the price-marginal cost ratio i.e. $\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}$, equation 40 can be rearranged to derive the following expression for markup in terms of general inputs:

$$\theta_{it}^X = \mu_{it} \frac{P_{it}^X X_{it}}{P_{it} Q_{it}} \tag{41}$$

where the output elasticity if an input X is denoted by θ_{it}^X. The resulting expression of markup will be:

$$\mu_{it} = \theta_{it}^X \frac{P_{it}Q_{it}}{P_{it}^X X_{it}} \tag{42}$$

to put differently we derive the expression of markup as follows:

$$\mu_{it} = \theta_{it}^X (\alpha_{it}^X)^{-1} \tag{43}$$

where α_{it}^X is the share of expenditure on input X_{it} in total sales P_{it}. In order to obtain a measure of firm-level markups using production data, is required only an estimate of the output elasticity of one (or more) variable inputs of production and data on expenditure share. The latter is directly observed in most micro data.

Note that with this approach of markup estimation there are in principles multiple first order conditions (for each variable input in production) that yield an expression for the markup. Regardless of which variable input of production is used the key elements to measure markups are:

- revenue share of variable input;
- output elasticity of variable input.

The whole source of variation comes from the ratio of expenditure on sales. The model does not assume anything on market structure or demand or constant return to scale, it just relies on fixed input prices and assumes cost minimization. The following step in De Loecker and Warzynski (2012) is the estimation of the production function inspired by the previously mentioned methods.

De Loecker and Eeckhout (2017) use as variable input an information contained in Compustat data: Cost of Good Sold (Cogs) which bundles all expenses directly attributable to the production of the goods sold by the firm and includes materials and intermediate inputs, labor cost, energy. In the simplest part of the paper, in which they just plot the data scaling for a constant output elasticity, they use a scale number quite high, around 0.85, highlighting the idea that the sample does not directly report a breakdown of the expenditure on variable inputs.

6.1.2 Our measures of profitability

Our aim is to investigate markups upon changes in competition. Our $Markup_{i,t}$ is constructed mimicking for the numerator the measure of COGs (Cost of Goods Sold) used by De Loecker and Eeckhout (2017). Moreover, since for this measure it is plausible an approximation of the output elasticity close to one, we are not going to rescale this measure for the output elasticity. $Markup_{i,t}$ for firm i at time t is computed as follows:

$$Markup_{i,t} = \frac{Markup\,numerator_{i,t}}{Markup\,denominator_{i,t}}100 \tag{44}$$

where:

- $Markup\,numerator$ is the variable indicating *Revenues from sales and performances*, variable measured in million euros;
- $Markup\,denominator$ is the sum of costs for *Raw materials and consumption*, *Services*, and *Payroll*, variables measured in million euros.

We also have an alternative measure of markup, constructed following De Loecker and Warzynski (2012) approach and will be called $MarkupMaterials_{i,t}$ throughout the text:

$$MarkupMaterials_{i,t} = \theta_{i,t}\frac{MarkupMaterials\,numerator_{i,t}}{MarkupMaterials\,denominator_{i,t}}100 \tag{45}$$

- $\theta_{i,t}$ is the output elasticity of the variable input *Raw materials and consumption*, we will calibrate this elasticity to 0.085;
- $MarkupMaterials\,numerator$ is the variable indicating *Revenues from sales and performances*, variable measured in million euros;
- $MarkupMaterials\,denominator$ is the variable indicating costs for *Raw materials and consumption*, measured in million euros.

The baseline empirical models we are going to estimate using both markup definitions as dependent variable ($y_{i,m,t}$) are the followings:

$$y_{i,m,t} = \alpha_0 + \alpha_1 Exit_m + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,t} \tag{46}$$

where $y_{i,m,t}$ is the markup for firm i at time t whose headquarter is in municipality m, $Exit_m$ is a variable that takes the value of one when the municipality m is involved in an episode of *seizure-confiscation* in its history, and zero otherwise. We also control for time (α_t), region (α_r), and sector (α_s) fixed effects.

Our second specification will be:

$$y_{i,m,t} = \alpha_0 + \alpha_1 ExitYear_{m,t} + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,t} \tag{47}$$

where $ExitYear_{m,t}$ is a variable that takes the value of one when the municipality m is involved in an episode of *seizure-confiscation* in a given year t, and zero otherwise. We also control for time (α_t), region (α_r), and sector (α_s) fixed effects.

We are going to estimate the exact same models using as left-hand side variable the labour share of each firm, computed as follows:

$$Labour\ share_{i,t} = \frac{Revenues\ from\ sales\ and\ performances_{i,t}}{Payroll_{i,t}} 100 \tag{48}$$

finally, we are going to divide municipalities in four different groups:

- municipality in which there has never been a *seized-confiscated firm* between 1982 and 2018, we will refer to these municipalities using the expression *pure* municipalities;
- municipality in which there has been just one *seized-confiscated firm* between 1982 and 2018, we will refer to these municipalities using the expression *risky* municipalities;
- municipality in which there has been more than one *seized-confiscated firm* between 1982 and 2018, we will refer to these municipalities using the expression *dangerous* municipalities;
- municipalities in which there has been at least one *seized-confiscated firm* between 1982 and 2018, we will refer to these municipalities using the expression *treated* municipalities.

RDD approach Throughout the analysis we are going to exploit also proximity selection of municipalities: we consider a sub-sample municipalities. The sub-sample consists of municipalities we called *treated*, together with municipalities that we are going to define *close* to *treated* municipalities. The criterion used to identify *close* municipalities is adjacency: is identified as *close* municipality each *pure* municipality which geographically has at least one point in common with or a *risky* or a *dangerous* municipality.

7 Data and empirical evidence

The exogenous shock we aim to exploit occurred in municipalities where firms have experienced prevention measures according to the D.L. 06/09/2011 n. 519, *Codice antimafia*, we will refer to these firms using the expression *"seized-confiscated firms"*; some of these firms were eligible for intermediate or definitive confiscation and others have already experienced destination, the final step according to the D.L. 06/09/2011 n. 519.

For the purpose of this analysis we exploit mainly two datasets: the source of the first dataset is AIDA, it contains information about Italian firms balance sheets; the source of the second dataset is ANBSC, it contains information about *seized-confiscated firms*.

In AIDA dataset we will focus on information about the balance sheet of 224,399 firms in Italy from 2008 to 2017, these were all firms in Italy with no missing information about return on sales, during all selected years.

In ANBSC dataset we will focus on information about the economic activity sector of *seized-confiscated firms* and the number of *seized-confiscated firms* which had their headquarter in a given Italian municipality, the data relate to the period 1982-2018, that is from the beginning of anti*mafia* legislation, started effectively with the L. 13/09/1982 n. 646, *Rognoni La Torre*. Due to some lacks in the data we do not have information about economic indicators of *seized-confiscated firms*.

Our analysis will be presented at the municipality level, averaging firms balance sheet information across municipalities.

Following Tables give an idea of the intensity of the phenomenon.

Table 1: Treatment episodes

Firms	**Municipality**	**Neighbours**	**Treated**	**Single**	**Multiple**	**TreatedYear**
3,504	677	1,657	522	374	148	843

Note: the table shows the episodes of *seized-confiscated firms* according to the D.L. 06/09/2011 n. 159, *Codice anfimafia*, Firm is the number of *seized-confiscated firms* and relates to the period 1982-2018, that is from the beginning of the anti*mafia* legislation, started effectively with the L. 13/09/1982 n. 646, *Rognoni La Torre*, Municipality is the number of municipalities in which are located the headquarters of *seized-confiscated firms* in the period 1982-2018, Neighbours is the number neighbouring municipalities, that is municipalities adjacent to Treated, Treated is the number of municipalities in AIDA involved in *seizure-confiscation* during 2008-2017, Single Treatment is the number of municipalities interested for just one year by the treatment, Multiple Treatments is the number of municipalities interested for more than one year by the treatment. TreatedYear is the number of year-municipality episodes of treatment.

Table 2: Economic activity sectors of *seized-confiscated firms*

Sector	Frequency	Percentage
Construction industry	932	26.60
Wholesale and retail	695	19.83
Real estate activities, rental, IT, research, business services	441	12.59
Other public social and personal services	398	11.36
Hotels and restaurants	344	9.82
Transport, warehousing and communications	190	5.42
Agriculture hunting and forestry	185	5.28
Manufacturing activities	91	2.60
Financial activities	82	2.34
Production and distribution of electricity gas and water	58	1.66
Minerals extraction	35	1.00
Fishing and related services	22	0.63
Health and social care	21	0.60
Other	10	0.27
Total	**3,504**	**100**

Note: the table shows the number of *seized-confiscated firms*, according to the D.L. 06/09/2011 n. 159, *Codice anfimafia*, in Italy across the economic sectors. The table relates to the period 1982-2018, that is from the beginning of the anti*mafia* legislation, started effectively with the L. 13/09/1982 n. 646, *Rognoni La Torre*.

Table 2 shows that the sector with the highest percentage of *seized-confiscated firms*, according to the D.L. 06/09/2011 n. 159, *Codice anfimafia*, is construction, with more than nine hundred firms interested; following wholesale and retail.

Table 3: Top five provinces and municipalities

Total number				**Relative to population**			
Province		**Municipality**		**Province**		**Municipality**	
Palermo	522	Palermo	341	Reggio Calabria	4.46	Bompensiere (Caltanissetta)	6.56
Napoli	376	Roma	324	Palermo	4.20	Candidoni (Reggo Calabria)	5.14
Roma	376	Napoli	165	Trapani	3.23	Antonimina (Reggio Calabria)	3.67
Reggio Calabria	246	Milano	153	Caltanissetta	2.60	Vallepietra(Roma)	3.27
Milano	200	Catania	87	Vibo Valentia	2.60	Santa Domenica Talao (Cosenza)	3.15

Note: the table shows the top five provinces and municipalities in terms of the number of *seized-confiscated firms*. The first column reports provinces with the highest frequency of *seized-confiscated firms* in the present; the second column reports municipalities with the highest frequency of *seized-confiscated firms* in the present; the third column reports provinces with the highest frequency of *seized-confiscated firms* in the present relative to the population, per 10,000 inhabitants; the fourth column reports municipalities with the highest frequency of *seized-confiscated firms* in the present relative to the population, per 1,000 inhabitants.

Table 3 shows that, in absolute value, the top five provinces and municipalities in terms of the number of *seized-confiscated firms* are in both south, center and north regions. When these values are weighted for the population, Table 3 shows in the leading positions just provinces and municipalities belonging to center and south regions.

Table 4: Top five provinces and municipalities

Relative to area					
Province			**Municipality**		
	Number	**Rate**		**Number**	**Rate**
Napoli	376	0.035	Villabate	13	3.42
Trapani	139	0.023	San Cipriano D'aversa	18	2.91
Prato	6	0.023	Casapesenna	7	2.30
Caltanissetta	71	0.015	Palermo	341	2.12
Barletta Andria Trani	22	0.014	Melito di Napoli	7	1.84

Note: the table shows the top five provinces and municipalities in terms of the number of *seized-confiscated firms*. The first three columns report provinces with the highest frequency of *seized-confiscated firms* in the present relative to the province area, per 10 km2; the second three columns report municipalities with the highest frequency of *seized-confiscated firms* in the present relative to the municipality area, per 1 km2.

Table 4 shows that the top five municipalities with the highest frequency of *seized-confiscated* firms per km2 are prevalently concentrated in south regions, where there are very little municipalities in terms of area with a discrete number of *seized-confiscated firms*.

Table 5: Top five provinces and municipalities

Municipality	**All firms**	***Seized-confiscated***	**Rate**
Bompensiere (Caltanissetta)	27	4	1.48
Antonimina (Reggio Calabria)	50	5	1.00
Candidoni(Reggio Calabria)	21	2	0.95
Roccella Valdemone(Messina)	28	2	0.71
Montedoro (Caltanissetta)	88	5	0.57

Note: the table shows the top five provinces and municipalities in terms of the number of *seized-confiscated firms*. All is the total number of firms in that municipality in 2011, source ISTAT, *Seized-confiscated* is the number of *seized-confiscated* firms, Rate is the number of *seized-confiscated* firms per 10 firms in that municipality.

Table 5 shows that the five municipalities with the highest number of *seized-confiscated firms* each ten firms are municipalities in south regions, results confirm the previously emerged idea that in very little economic and demographic realities, as in south Italy, even a small number of firms under treatment can be quantitatively important.

Table 6: Highest yearly seizure-confiscation rate relative to the population.

Municipality	**Year**	***Seized-confiscated***	**Rate**
Bompensiere (Caltanissetta)	2012	4	6.56
Candidoni(Reggio Calabria)	2011	2	5.14
Antonimia(Reggio Calabria)	2014	5	3.70
Valle Pietra(Roma)	2014	1	3.27
Santa Domenica Talao(Cosenza)	2013	4	3.14

Note: the table shows the top five municipalities with the highest *seizure-confiscation* rate per 1,000 inhabitants in a given year. *Seized-confiscated* is the number of *seized-confiscated* firms, Rate is the number of *seized-confiscated* firms per 1,000 inhabitants.

Table 6 confirms the insight that small municipalities, especially from south and center have a leading position in terms of seizure-confiscation rate per 1,000 inhabitants in a given year.

7.1 Descriptive statistics

Table 7: Test on balance sheet indexes

Variable	1	**0**	Diff	1	**0**	Diff
Markup	125.71	128.86	3.158***	126.53	128.86	2.338***
	[0.02]	[0.04]	[0.042]	[0.03]	[0.04]	[0.052]
N	1,725,628	402,258	2,127,886	567,479	402,258	969,737
MarkupMaterials	136.48	249.95	113.467***	178.33	249.95	71.616***
	[0.31]	[0.93]	[0.784]	[0.63]	[0.93]	[1.084]
N	1,652,272	361,067	2,013,339	530,984	361,067	892,051
Labour share	14.52	14.41	-0.108***	14.64	14.41	-0.225***
	[0.01]	[0.02]	[0.021]	[0.02]	[0.02]	[0.026]
N	1,756,282	417,147	2,173,429	579,952	417,147	997,099

[1] Test on balance sheet indexes, the first three columns compare municipalities in which there are zero *seized-confiscated firms* in a given year and municipalities in which there has been at least one *seized-confiscated firm* in a given year; the second three columns consider in the sample only municipalities in which there as been at least one *seized-confiscated firm* in the history, and, among these, the second three columns compare municipalities in which there are zero *seized-confiscated firms* in a given year and municipalities in which there has been at least one *seized-confiscated firm* in a given year.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 7 shows that, when is exploited the time dimension, municipalities in which the treatment is present at least once in a given year have on average a bigger markup—statistically significant—independently from the measure of markup chosen (Markup or MarkupMaterials), the difference in labour share is significantly negative; moreover Table 7 shows that, when is considered exclusively the sample of treated municipalities and also exploited the time dimension, municipalities in which the treatment is present at least once in a given year have on average a bigger markup—statistically significant—independently from the measure of markup chosen (Markup or MarkupMaterials), the difference in labour share is significantly negative and the effect is risen with the restricted sample.

Table 8: Test on balance sheet indexes

Variable	1	**0**	Diff	1	**0**	Diff
Markup	126.09	129.31	3.217***	125.77	127.88	2.115***
	[0.02]	[0.04]	[0.047]	[0.06]	[0.03]	[0.067]
N	1,051,179	404,422	1,455,601	176,015	793,722	969,737
MarkupMaterials	159.7	276.63	116.925***	140.98	222.66	81.679***
	[0.47]	[1.07]	[1.012]	[0.97]	[0.62]	[1.362]
N	999,178	364,295	1,363,473	167,578	724,473	892,051
Labour share	14.5	14.43	-0.065***	14.63	14.52	-0.110***
	[0.01]	[0.02]	[0.023]	[0.03]	[0.01]	[0.033]
N	1,068,535	417,355	1,485,890	179,06	818,039	997,099

[1] Test on balance sheet indexes, the first three columns consider only *risky*, *dangerous* and *close* municipalities, and, among these, the first three columns compare municipalities in which there are zero *seized-confiscated firms* in a given year and municipalities in which there has been at least one *seized-confiscated firm* in a given year; the second three columns consider only *risky* and *dangerous* municipalities, and, among these, the second three columns compare *risky* municipalities (control group) with respect to *dangerous* municipalities (treatment group).

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$

Results in Table 8 confirm the previous evidence on the variables behaviour; moreover Table 8 shows that, using the restricted sample—composed of treated and close municipalities— and also exploiting the time dimension, only slightly alter results. Municipalities in which the treatment is present at least once in a given year have on average a bigger markup—statistically significant—independently from the measure of markup chosen (Markup or MarkupMaterials), the difference in labour share is significantly negative.

7.2 Results

Table 9: Exit effect on markup

	(1)	(2)	(3)	(4)
			Panel A	
Exit	2.192***	1.054***	1.053***	0.624***
	(66.52)	(34.01)	(34.00)	(18.56)
N	2,127,886	2,127,886	2,127,886	2,127,886
			Panel B	
Exit	2.652***	1.019***	1.019***	0.721***
	(58.99)	(24.14)	(24.14)	(16.59)
N	1,455,601	1,455,601	1,455,601	1,455,601
Sector	No	Yes	Yes	Yes
Year	No	No	Yes	Yes
Region	No	No	No	Yes

[1] Note: Panel A: Regress Markup on the variable Exit that indicates a municipality in which there has been at least one *seized-confiscated firm*, controlling for time, region, and sector fixed effects. Panel B: Regress Markup on the variable Exit that indicates a municipality in which there has been at least one *seized-confiscated firm*, controlling for time, region, and sector fixed effects. The sample consists of risky, dangerous and close municipalities.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 9 shows that the effect on Markup of the variable Exit is positive and significant. When fixed effects are included, the effect decreases, though it stays positive and significant, around 0.62 percent-

age points; moreover Table 9 shows that using the restricted sample—composed of treated and close municipalities—only slightly alter results. Controlling for fixed effects, the effect of Exit on Markup decreases, though it stays positive and significant, around 0.72 percentage points.

Table 10: Dropping regions

	(1)	(2)	(3)	(4)	(5)
	Sicily	Calabria	Apulia	Campania	Lazio
Exit	0.687***	0.732***	0.729***	0.703***	0.609***
	(15.52)	(16.75)	(16.23)	(15.71)	(13.66)
N	1,379,642	1,433,420	1,376,782	1,338,451	1,258,197
Sector	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes

[1] Note: Regress Markup on the variable Exit that indicates a municipality in which there has been at least one *seized-confiscated firm*, controlling for time, region, and sector fixed effects. The sample consists of risky, dangerous and close municipalities. In the first model are deleted just observations belonging to Sicily, in the second just observations belonging to Calabria, in the third just observations belonging to Apulia, in the fourth just observations belonging to Campania, in the fifth just observations belonging to Lazio.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 10 shows that dropping from the restricted sample—composed of treated and close municipalities—respectively Sicily, Calabria, Apulia, Campania and Lazio—historically considered the more critical regions in terms of criminality—the effect of TreatedMunicipality on Markup remains stable, positive and significant, around 0.68-0.73 percentage points.

Table 11: ExitYear effect on Markup

	(1)	(2)	(3)	(4)	(5)
			Panel A		
ExitYear	3.158***	1.597***	1.585***	0.999***	1.035***
	(75.36)	(40.84)	(40.25)	(23.15)	(23.32)
N	2,127,886	2,127,886	2,127,886	2,127,886	2,127,886
			Panel B		
ExitYear	3.217***	1.510***	1.502***	1.054***	1.102***
	(68.16)	(34.23)	(33.66)	(21.68)	(21.88)
N	1,455,601	1,455,601	1,455,601	1,455,601	1,455,601
			Panel C		
ExitYear	2.472***	1.249***	1.256***	0.820***	0.885***
	(45.49)	(24.88)	(24.52)	(14.43)	(14.66)
N	974,276	974,276	974,276	974,276	974,276
Sector	No	Yes	Yes	Yes	Yes
Year	No	No	Yes	Yes	Yes
Region	No	No	No	Yes	Yes
Sector-Year	No	No	No	No	Yes
Region-Year	No	No	No	No	Yes

[1] Note: Panel A: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. Panel B: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. The sample consists just of risky, dangerous and close municipalities. Panel C: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. The sample consists just of risky and dangerous municipalities.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 11 shows that the effect on Markup of the variable ExitYear is positive and significant. When time, region, and sector fixed effects are included, the effect decreases, though it stays positive and significant, around 1 percentage point; when sector-year and region-year interactions are included, to take out industry specific aggregate trends and region specific aggregate trends in markups, the effect slightly increases. Moreover Table 11 shows that using the restricted sample—composed of treated and close municipalities—only slightly alter results; when sector-year, and region-year fixed effects are included, the effect of ExitYear on Markup stays positive and significant, around 1.1 percentage points. Table 11, Panel C, shows that using the restricted sample—composed of treated municipalities—only slightly alter results; when sector-year, and region-year fixed effects are included, the effect of ExitYear on Markup stays positive and significant, around 0.89 percentage points. Overall, Table 11 shows that the effect of ExitYear on Markup is higher with respect to the effect of Exit on Markup.

Table 12: Dropping regions

	(1)	(2)	(3)	(4)	(5)
	Sicily	Calabria	Apulia	Campania	Lazio
ExitYear	1.074***	1.077***	1.070***	0.890***	0.816***
	(21.34)	(21.98)	(21.45)	(17.42)	(15.51)
N	1,379,642	1,433,420	1,376,782	1,338,451	1,258,197
Sector	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes

[1] Note: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, and sector fixed effects. The sample consists just of risky, dangerous and close municipalities. In the first model are deleted just observations belonging to Sicily, in the second just observations belonging to Calabria, in the third just observations belonging to Apulia, in the fourth just observations belonging to Campania, in the fifth just observations belonging to Lazio.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 12 shows that dropping from the restricted sample—composed of treated and close municipalities—respectively Sicily, Calabria, Apulia, Campania and Lazio—historically considered the more critical regions in terms of criminality—the effect of ExitYear on Markup remains stable, positive and significant, around 0.11-0.82 percentage points.

Table 13: ExitYear effect on Labour share

	(1)	(2)	(3)	(4)	(5)
			Panel A		
ExitYear	-0.108***	-0.136***	-0.0914***	-0.195***	-0.169***
	(-5.19)	(-7.17)	(-4.80)	(-9.35)	(-7.86)
N	2,173,429	2,173,429	2,173,429	2,173,429	2,173,429
			Panel B		
ExitYear	-0.0654***	-0.192***	-0.136***	-0.195***	-0.173***
	(-2.90)	(-9.30)	(-6.54)	(-8.60)	(-7.39)
N	1,485,890	1,485,890	1,485,890	1,485,890	1,485,890
			Panel C		
ExitYear	-0.227***	-0.329***	-0.264***	-0.173***	-0.151***
	(-8.78)	(-14.05)	(-11.06)	(-6.54)	(-5.39)
N	997,619	997,619	997,619	997,619	997,619
Sector	No	Yes	Yes	Yes	Yes
Year	No	No	Yes	Yes	Yes
Region	No	No	No	Yes	Yes
Sector-Year	No	No	No	No	Yes
Region-Year	No	No	No	No	Yes

[1] Note: Panel A: Regress Labour share on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. Panel B: Regress Labour share on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. The sample consists just of risky, dangerous and close municipalities. Panel C: Regress Labour share on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, sector, sector-year, and region-year fixed effects. The sample consists just of risky and dangerous municipalities.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 13 shows that the effect on Markup of Labour share is negative and significant. When time, region, and sector fixed effects are included, the effect rises in absolute value, it stays negative and significant, around 0.2 percentage points; when sector-year, and region-year fixed effects are included, the effect slightly decreases in absolute value. Moreover, Table 13 shows that using the restricted sample—composed of treated and close municipalities—only slightly alter results; when sector-year, and region-year fixed effects are included, the effect of ExitYear on Labour share stays negative and significant, around 0.17 percentage points. Table 13, Panel C, shows that using the restricted sample—composed of treated municipalities—only slightly alter results; when sector-year, and region-year fixed effects are included, the effect of ExitYear on Labour share stays negative and significant, around 0.15 percentage points. Overall, Table 13 shows that the effect of ExitYear on Labour share is negative and significant.

7.2.1 Difference-in-Differences

From the Table 2 we observe the distribution among sectors of *seized-confiscated firms*. We now exploit and investigate the effect of a change in competition on markups from a sector prospective.
The model we use in this case is a Difference-in-Differences model, applied to the observations we adopted in the RDD approach. Ideally we separate sectors with a higher frequency of *seized-confiscated firms*, which we are going to call *unhealthy* sectors, to those sectors in which the frequency of *seized-confiscated firms* is relatively low, which we define *almost healthy* sectors. We choose a threshold, identifying *unhealthy* sectors as those sectors with more than a hundred *seized-confiscated firms*.
We analyse the difference in markup between *unhealthy* and *almost healthy* sectors, comparing *treated* municipalities with *close* municipalities. When we analyse observations belonging to *unhealthy* sectors, comparing *treated* municipalities with *close* municipalities, the effect is highly different from the effect obtained analysing just *almost healthy* sectors and making the same municipality comparison. We may want to conclude the effect is driven by *unhealthy* sectors. To clear the effect, the Difference-in-Differences model comes to our purpose, we exploit the difference between *treated* and *close* municipalities in *unhealthy* sectors and the difference between *treated* and *close* municipalities in *almost healthy* sectors. The model takes this form:

$$Markup_{i,m,,t} = \alpha_0 + \alpha_1 Exit * Unhealthy_{m,s} + \alpha_2 Exit_m + \alpha_3 Unhealthy_s + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,s,t} \tag{49}$$

the coefficient of the regressor $Exit * Unhealthy_{m,s}$ is the Difference-in-differences estimate, this regressor is the product of the dummy for *Unhealthy* sectors, which takes the value of one if firm i belongs to the unhealthy sector s and the dummy variable Exit, that takes the value of one if firm i has the headquarter in a municipality m in which there has been at least one *seized-confiscated firm*. We also control for time

(α_t), region (α_r) and sector (α_s) effects.

Table 14: Difference-in-Differences by sector.

	(1)	(2)	(3)
	All	Unhealthy	Healthy
Exit*Unhealthy	0.638***		
	(7.14)		
Exit	0.298***	1.011***	0.0716
	(4.05)	(18.42)	(1.03)
Unhealthy	1.709		
	(0.00)		
N	1,455,601	1,012,665	442,936
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Region	Yes	Yes	Yes

[1] Note: Regress Markup on the variable Exit, that indicates a municipality in which there has been at least one *seized-confiscated firm*, controlling for time, region, and sector fixed effects. The first model is a Difference-in-Differences with all sectors, the second only considers unhealthy sectors, the third only considers healthy sectors.

[2] Significance levels: * < 10% ** < 5% *** < 1%. t statistics in parenthesis.

Table 14 shows that the effect of Exit on Markup is largely driven from unhealthy sectors, which we consider sectors largely affected by *seizure-confiscation*.

Table 15: Unhealthy vs Healthy sectors

	(1)	(2)	(3)
	All	Unhealthy	Healthy
ExitYear*Unhealthy	0.455***		
	(4.33)		
ExitYear	0.707***	1.278***	0.379***
	(7.54)	(22.07)	(4.16)
Unhealthy	-0.279		
	(-0.00)		
N	1,455,601	1,012,665	442,936
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Region	Yes	Yes	Yes

[1] Note: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in given year, controlling for time, region, and sector fixed effects. The first model is a Difference-in-Differences with all sectors, the second only considers unhealthy sectors, the third only considers healthy sectors.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

8 Conclusions

The concern over the possibility of increasing monopoly power has spurred studies where the relationship between market power and competition is the common thread. On the heels of this spread interest in literature, we contribute evidence on the effects of competition on markups and profits, relying on a quasi-experiment. We exploit measures of plausibly exogenous variations in the degree of market competition at a local level, by exploiting an Italian law which, upon evidence of relationship between firms' owners and mafia groups, mandates the expropriation of property rights of the formers to undermine the economic power of *mafiosi* through the destruction of their heritage. Firms and other real estates are seized or confiscated when their owners—eventually already targeted by the personal prevention measures—are not able to explain the legal origin of the goods. For the purpose of our research, we use information about *seized-confiscated firms* to construct a measure of an exogenous firms' exit shock. The empirical model we propose investigates markup and profit variations to estimate the causal effect of a change in the strength of competition.

We look at the effect on markup and labour share of a change in the number of firms due to the unanticipated negative shock driven by the *seizure-confiscation* episode. Results show that, due to the treatment, markup increases by 0.8 percentage points while labour share reduces by 0.2 percentage points.

The idea behind the decline in labour share can in principle have two sources, both connected with profits and markups. On one hand, in the absence of market power and zero profits, one explanation for the labour share to go down may be the change in technology towards fixed factors different from labour, which can shrink the demand of labour, thus a positive markup would be just indicative of a firm covering this new overhead costs derived from the change in technology. On the other hand, in the presence of market power, positive profits and overhead costs, also composed by the fixed part of labour costs, if technology is fixed but there is an decrease in competition, labour share decreases consequently to an increase in markup, that covers all the fixed costs and contemporaneously generates profits. From the stylized Cournot model with endogenous entry we observe that when the number of firms decreases, there is an increase in markup, an increase in prices, a decrease in quantity which leads to a decline in labour demand; the decline in labour demand shrinks nominal wages and due to the increase of prices, real wages go down even more.

Overall, results support the theoretical idea that a reduction in the number of firms leads to an increase in market power, suggesting that imperfect competition is a realistic representation of how local market behaves. Moreover, results also confirm Autor et al. (2017) and De Loecker and Eeckhout (2017) insights that a rise in markup is consistent with a decline in the labour share.

A Appendix

A.1 Data description

The sources of our data are:

- *Agenzia Nazionale per l'amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata* (ANBSC), this institute collects information about firms that have been seized, according to the D.L. 06/09/2011 n. 159, *Codice antimafia*, some of these firms were eligible for intermediate or definitive confiscation and others have already experienced destination;

- *Istituto nazionale di statistica* (ISTAT), from which we collected general information about Italian Municipalities;

- *Analisi informatizzata delle aziende di capitale italiane* (AIDA), Bureau van Dijk Electronic Publishing. It is a database in which are included balance sheet information of all Italian firms required to file an official account.

The variable at our disposal are:

- **Municipality**: local governments where is located the headquarters of the *seized-confiscated firms* D.L. 06/09/2011 n. 159, *Codice antimafia*, thus their business center. Source: ANBSC.

- **Number of firms**: the number of firms that are *seized-confiscated firms* D.L. 06/09/2011 n. 159, *Codice antimafia* in a local government. Source: ANBSC.

- **Number of firms per year**: the number of firms per year that are *seized-confiscated firms* D.L. 06/09/2011 n. 159, *Codice antimafia* in a local government. Source: ANBSC.

- **Exit**: is a dummy that takes the value of one if in the municipality there has been at least one *seized-con*

  fiscated firm, according to the D.L. 06/09/2011 n. 159, *Codice antimafia*, zero otherwise. Source: ANBSC.

- **ExitYear**: is a dummy that takes the value of one if in the municipality in a given year there has been at least one *seized-confiscated firms*, according to the D.L. 06/09/2011 n. 159, *Codice antimafia*, zero otherwise. Source: ANBSC.

- **Judicial office**: the judicial office which emitted the sentence for the *seized-confiscated firms*: *Cassation courtCourt of appeal*; *Prosecutor's office*; *Court*. Source: ANBSC.

- **Category**: the category at which the *seized-confiscated firms* belongs, thus what kind of juridical form it assumes: *Association*; *Consortium*; *Individual company*; *Limited liability company*; *Cooperative company*; *Limited liability cooperative company*; *Limited partnership*; *General partnership*; *Joint stock company*; *Simple company*. Source: ANBSC.

- **Sector**: the economic activity sector of the economy in which the *seized-confiscated firms* operate their activity: *Agriculture hunting and forestry*; *Hotels and restaurants*; *Other public social and personal services*; *Financial activities*; *Real estate activities, rental, IT, research, business services*; *Manufacturing activities*; *Wholesale and retail*; *Construction industry*; *Extraction of minerals*; *Fishing and related services*; *Production and distribution of electricity gas and water*; *Health and social care*; *Transport, warehousing and communications*. Source: ANBSC.

- **Destination type**: the destination chosen by the *Judicial office* for the *seized-confiscated firms* that have experienced destination: *Rent*; *Free transfer*; *Liquidation*; *Sale*. Source: ANBSC.

- **Destination decree**: the number of decree of destination. Source: ANBSC.

- **Decree date**: it is the date in which has been issued the *Destination decree* for the*seized-confiscated firm* that have experienced destination, the years go from 1982 to 2019. Source: ANBSC.

- **Population**: it is the population in 2011 at municipal level, the measure of the population is in unit. Source: ISTAT.

- **Area**: it is the territorial area in 2011 at municipal level, the measure of the surface is in square kilometres. Source: ISTAT.

- **Markup numerator**: it is the variable indicating *Revenues from sales and performances*, variable measured in millions of euros. Source: AIDA.

- **Markup denominator**: it is the sum of costs for *Raw materials and consumption*, *Services*, and *Payroll*, variables measured in millions of euros. Source: AIDA.

- **Markup**: it is the ratio of the *Markup numerator* and *Markup denominator*, times 100.

- **MarkupMaterials numerator**: it is the variable indicating *Revenues from sales and performances*, variable measured in millions of euros. Source: AIDA.

- **MarkupMaterials denominator**: it is the variable indicating the cost for *Raw materials and consumption*, variable measured in millions of euros. Source: AIDA.

- **MarkupMaterials**: it is the ratio of the *MarkupMaterials numerator* and *MarkupMaterials denominator*, times 100.

- **Labour share**: it is the ratio of the *Revenues from sales and performances* and *Payroll*, times 100.

A.2 Unhealthy and costruction

Table 16: Exogenous exit effect per municipality in a given year. Differencing for sectors.

	(1)	(2)	(3)
	All	Unhealthy	Construction
ExitYear	1.054***	1.278***	0.000346
	(21.68)	(22.07)	(0.00)
N	1,455,601	1,012,665	140,031
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Region	Yes	Yes	Yes

[1] Note: Regress Markup on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in given year, controlling for time, region, and sector fixed effects. The sample consists just of risky, dangerous and close municipalities. The first model considers all economic sectors, the second model only considers unhealthy sectors, the third model only considers construction.

[2] Significance levels: * $<$ 10% ** $<$ 5% *** $<$ 1%. t statistics in parenthesis.

Table 16 shows that the effect of ExitYear on Markup is largely driven from unhealthy sectors, but construction is not a leading sector in this sense.

Table 17: Exogenous exit effect per municipality in a given year. Differencing for sectors.

	(1)	(2)	(3)
	All	Unhealthy	Construction
ExitYear	49.99***	55.94***	35.04***
	(49.90)	(43.70)	(19.42)
N	1,363,473	931,633	141,547
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Region	Yes	Yes	Yes

[1] Note: Regress MarkupMaterials on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, and sector fixed effects. The sample consists just of risky, dangerous and close municipalities. The first model considers all economic sectors, the second model only considers unhealthy sectors, the third model only considers construction.

[2] Significance levels: * < 10% ** < 5% *** < 1%. t statistics in parenthesis.

Table 17 shows that the effect of ExitYear on MarkupMaterials is largely driven from unhealthy sectors, and, differently from Markup, construction is a leading sector in this sense.

Table 18: Exogenous exit effect per municipality in a given year. Differencing for sectors.

	(1)	(2)	(3)
	All	Unhealthy	Construction
ExitYear	-0.195***	-0.129***	-0.897***
	(-8.60)	(-4.94)	(-12.34)
N	1,485,890	1,046,511	148,262
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Region	Yes	Yes	Yes

[1] Note: Regress Labour share on the variable ExitYear, that indicates a municipality in which there has been at least one *seized-confiscated firm* in a given year, controlling for time, region, and sector fixed effects. The sample consists just of risky, dangerous and close municipalities. The first model considers all economic sectors, the second model only considers unhealthy sectors, the third model only considers construction.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 18 shows that the effect of ExitYear on Labour share is largely driven from construction sector.

A.3 City council dismissal, *Commissariamento* and markup movements

In this section the aim is to capture the effect on firms markup of an exogenous shock to the city council of a municipality. This section connects to the empirical literature that focused on markup variability during the business cycle.

The mentioned shock referred to municipalities experiencing a city council dismissal according to the D.L. 31/05/1991 n. 164, *Commissariamento*, we will refer to these municipalities using the expression *"dismissed"* municipalities, or municipalities in which has occurred a *"city council dismissal"*.

For the purpose of this analysis we exploit mainly two datasets: the source of the first dataset is AIDA, it contains information about Italian firms balance sheets; the source of the second dataset is Ministry of Justice, it contains information about *dismissed* municipalities.

In AIDA dataset we will focus on information about the balance sheet of 224,399 firms in Italy from 2008 to 2017, these were all firms in Italy with no missing information about return on sales, during all selected years.

In Ministry of Justice dataset we will focus on information about the number of times a municipality has experienced a *city council dismissal*.

Finally, we are going to divide municipalities in five different groups:

- Municipality in which there has never been a *city council dismissal*, we will refer to these municipalities using the expression *never dismissed* municipalities;
- Municipality in which there has been just once a *city council dismissal*, we will refer to these municipalities using the expression *once dismissed* municipalities;
- Municipality in which there has been more than once a *city council dismissal*, we will refer to these municipalities using the expression *more than once dismissed* municipalities;
- Municipalities in which there has been at least once a *city council dismissal*, we will refer to these municipalities using the expression *dismissed* municipalities;
- Municipality in which there has never been a *city council dismissal*, but that had at least a geographical point in commmon with a *dismissed* municipality, we will refer to these municipalities using the expression *adjacent to dismissed* municipalities.

We present results based on these specification:

$$Markup_{i,m,t} = \alpha_0 + \alpha_1 CD_{m,t} + \alpha_s + \alpha_t + \alpha_r + \epsilon_{i,m,t} \tag{50}$$

where $Markup_{i,m,t}$ is the general markup for firm i at time t whose headquarter is in municipality m, $CD_{m,t}$ is a variable that takes the value of one if the municipality m has been dismissed in a given year t. We also control for time (α_t), region (α_r), and sector (α_s) fixed effects.

Table 19: Total *dismissals* and municipalities interested

	Dismissal	Municipality
All	288	220
2008-2017	89	81

Note: the table shows the number of *dismissed* municipalities, according to the D.L. 31/05/1991 n. 164, *Commissariamento*; the first row indicates the number of total *mafia* dismissals (1991-2019), the second row indicates the number of total mafia dismissals in AIDA sample which goes from 2008 to 2017. The first column indicates the number of total dismissals, the second column indicates the municipalities interested over time.

Table 20: The effect of council dismissals

	(1)	(2)	(3)	(4)
CD	-1.431***	-0.747*	-0.927**	-0.689
	(-2.94)	(-1.71)	(-2.11)	(-1.56)
N	238,593	238,593	238,593	238,593
Sector	No	Yes	Yes	Yes
Year	No	No	Yes	Yes
Region	No	No	No	Yes

[1] Note: Regress Markup on the variable CD that indicates a municipality dismissed in a given year, controlling for time, region, and sector fixed effects. The sample consists just of dismissed municipalities and municipalities adjacent to dismissed, but never dismissed.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 21: Exogenous dismissal effect per municipality in a given year, construction sector

	(1)	(2)	(3)	(4)
CD	0.292	0.124	0.00986	0.598
	(0.22)	(0.09)	(0.01)	(0.44)
N	28,110	28,110	28,110	28,110
Sector	No	Yes	Yes	Yes
Year	No	No	Yes	Yes
Region	No	No	No	Yes

[1] Note: Regress Markup on the variable CD that indicates a municipality dismissed in a given year, controlling for time, region, and sector fixed effects. The sample consists just of dismissed municipalities and municipalities adjacent to dismissed, but never dismissed. The macro-sector considered in the sample analysed is just construction.

[2] Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

A.4 Maps

Figure 8 shows a detailed map of Italian municipalities: in red municipalities in which there has been more than one *seized-confiscated firm* between 1982 and 2018 (Dangerous); in blue municipalities in which there has been one *seized-confiscated firm* between 1982 and 2018 (Risky); in yellow municipalities in which there has never been a *seized-confiscated firm* between 1982 and 2018, but are adjacent to municipalities in which there has been at least one*seized-confiscated firm* between 1982 and 2018 (Close); in white municipalities in which there has never been a *seized-confiscated firm* between 1982 and 2018 and are not adjacent to municipalities in which there has been at least one *seized-confiscated firm* between 1982 and 2018 (Pure).

Figure 8: *Seized-confiscates firms* in Italy at municipality level

(1982-2018)

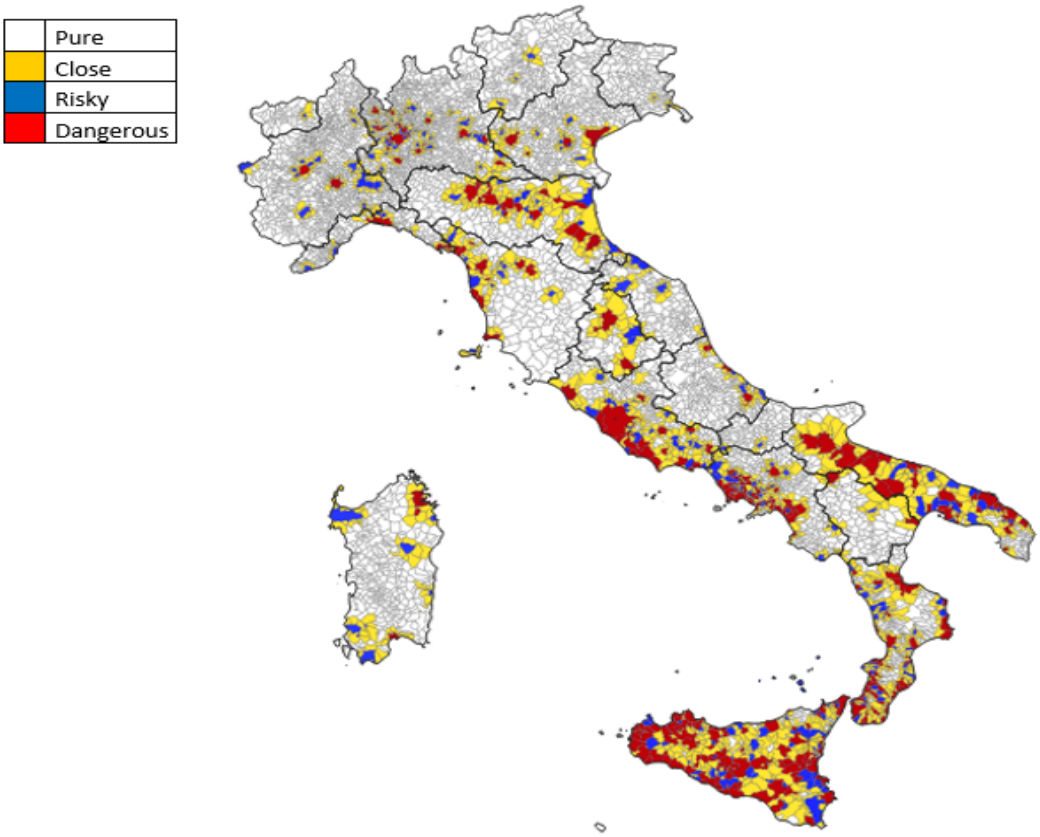
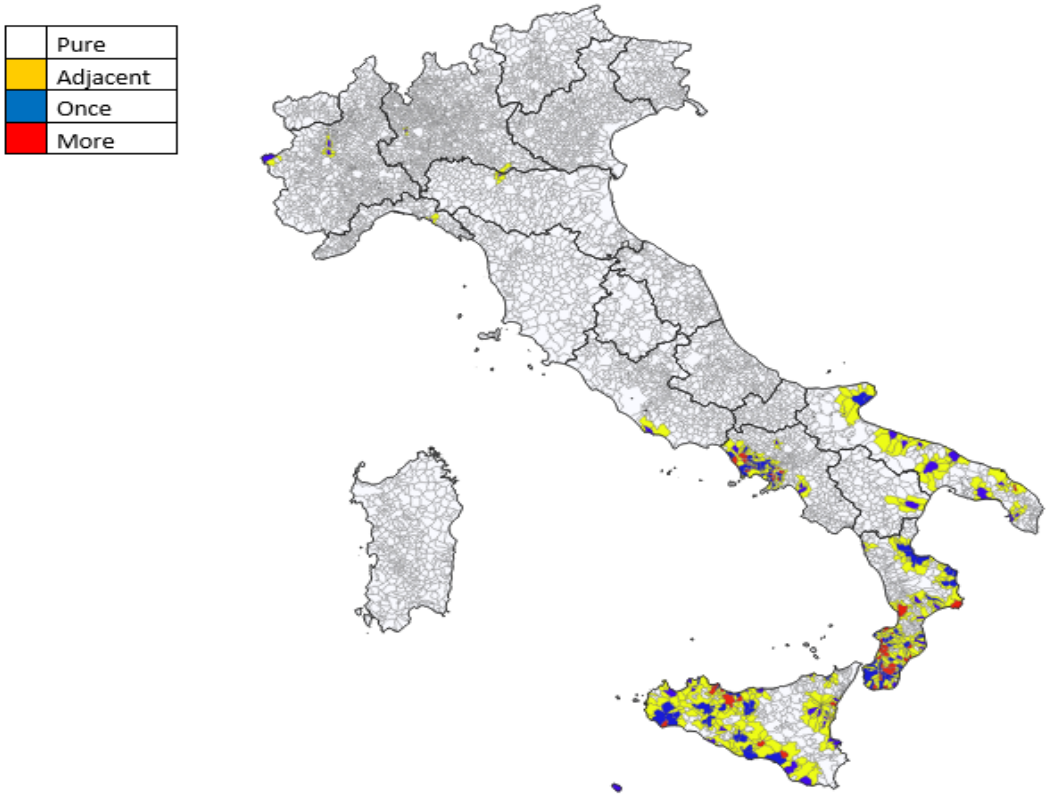


Figure 9 shows a detailed map of Italian municipalities: in red municipalities in which there has been more than one *city council dismissal* between 1991 and 2019 (More dismissed); in blue municipalities in which there has been one *city council dismissal* between 1991 and 2019 (Once dismissed); in yellow municipalities in which there has never been a *city council dismissal* between 1991 and 2019, but are adjacent to municipalities in which there has been at least one *city council dismissal* between 1991 and 2019 (Adjacent); in white municipalities in which there has never been a *city council dismissal* between 1991 and 2019 and are not adjacent to municipalities in which there has been at least one *city council dismissal* between 1991 and 2019 (Pure).

Figure 9: *City council dismissal* in Italian municipalities

(1991-2018)



A.5 The behaviour of markups in a "deep habits" environment

The internal and external type of standard habit-formation model assumes that households form habits from consumption of a single aggregate good. This assumption leads to important consequences, the introduction of habit formation alters the propagation of macroeconomic shocks, because it modifies the way in which aggregate demand and possibly the supply of labour respond to such shocks. The formalization of habits is considered from a general point of view from Ravn et al. (2004): private agents are considered to form habits not simply for the overall consumption level, but rather for the consumption of individual goods. Consumers in this model can form habits on narrow categories of goods (clothing, goods, vacation), this description of preference takes the name of "deep habits", while the other kind of preferences are denominated "superficial". A piece of theory on deep habits is embedded in Houthakker and Taylor (1970) classic work on consumption demand. The empirical literature on consumer behaviour often shows that usually past brand choices affect consumer's choice over different goods' brand (Chintagunta et al., 2001). The fact that consumer can form habits on a good-by-good basis leads to two implications for aggregate dynamics: first the demand side of the macroeconomy is indistinguishable from

the demand side pertaining to an environment in which agents have superficial habits; second the supply side of economy is altered, in fact, when habits are formed at the level of individual goods, firms consider the future demand they will face as depending on their current sales, in fact if the consumption of a particular good is high in the current period, other things being equal, the consumer will be more willing to buy the same good because of his habits. When habits are ingrained, the optimal pricing problem becomes dynamic. Ravn et al. (2004) include the deep habit formation assumption in an economy with imperfectly competitive product markets, this results in a model of endogenous time-varying markup of prices over marginal cost. The resulting markup behave countercyclically in equilibrium (in line with Rotemberg and Woodford (1999)): expansions in output driven by some kind of shocks like productivity shocks, preference shocks, government spending shocks, are associated to declines in markups. It is reasonable the reaction of markups being countercyclical in the deep-habit model, the demand faced by an individual firm i in period t is of the form:

$$q_{it} = p_{it}^{-\eta} \left(q_t - \theta q_{t-1} \right) + \theta q_{it-1} \tag{51}$$

where q_{it} denotes the demand for good i, p_{it} is the relative price of good i and q_t is the aggregate demand. The single firms takes the evolution of the aggregate demand as given. The parameted θ, included between zero and one, measures the strength of external habit for good i. Two terms compose the demand function, the first that displays the price elasticity, η, the second term is exclusively originated from habitual consumption of good i. The second term is price inelastic. The price elasticity of demand for good i is a weighted average between these two elasticities η and 0. The weight on η is given by share of price elastic term in total demand, which increases when aggregate demand increases, and as a result the price elasticity increases too. This is called *price elasticity effect of deep habits*. Markup is inversely related to price elasticity of demand, so, under deep habits, an expansion in aggregate demand implies a reduction in markup. Under superficial habits or no habits, firm i face this kind of demand:

$$q_{it} = p_{it}^{-\eta} q_t \tag{52}$$

where the price elasticity of demand for good i is independent of the level of aggregate demand. In fact, it is constant and equal to η implying a time-invariant markup. Another channel through which deep habits influence the equilibrium dynamics of markups is the intertemporal effect. The effect is consequence of the fact that current price decisions affect future demand through the channel of habits. If the present value of expected per unit profits are high, firms have incentives to invest more in costumer base today, this way they built up their current of habits. So the process of formation of deep habits is done inducing current higher sales athwart a decline in current makrups. The deep habit model implies a gradual substitution between differentiated goods, not as in the switching -cost/consumer- market model which implies discrete

switches among suppliers. Deep habit model is an advantage from an analytical point of view, it does not lead to face an aggregation problem. In equilibrium buyers can distribute their purchase identically, still suppliers face a gradual loss of consumer if they raise their relative prices. Deep habits formation model is a way to incorporate switching-cost/consumer-market models into a dynamic general equilibrium framework. Not all elements of aggregate demand are for sure subject to deep-habit formation, so changes in the composition of aggregate demand will affect the intertemporal effects of deep habits on markup. For instance, if investment spending is not subject to habit forming behaviour, a positive shock to the share of investment in aggregate spending, i.e. aggregate productivity shock, would reduce the overall importance of habits and alter pricing behaviour of firms. The paper leads to the important result of the countercyclicality of markup, opposite to the literature versions of customer-market and switching costs, that have been under criticism because imply procyclical markups. The paper also estimates the structural parameters of the deep external habit model, having as result a relatively high degree of habit persistence and internal evolution of the stock habits over time. Habits are defined from Euler's equation, restriction also used to estimate deep habits, but the deep habit model contains more equilibrium conditions used to identify the habit parameters, namely, supply-side restrictions stemming from the optimal pricing decision of firms. In the work, Ravn et al. (2004) exploit these additional identifying restrictions to obtain more efficient estimates of the habit parameter.

In models with imperfectly competitive product markets is assumed that households have preferences over a large number of differentiated goods. Ravn et al. (2004) investigate about the level at which habit formation is assumed to occur, which has great macroeconomic consequences: when habits are formed at the level of each individual variety of consumption good, the demand function faced by the firm depends not only on the relative price of the good and aggregate income, but also on past sales of the particular good in question. Past theories of countercyclical markups face a trade off between the elasticity of the markup with respect to aggregate demand and the level of the markup. Typically when the average markup is restricted to realistic level, old theories predict too low an elasticity of the markup to explain the cyclical behaviour of wages and consumption in response to demand shocks. The deep habit model overcomes this trade off, can be predicted high markup elasticities without requiring empirically unrealistic levels of average markups.

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Chapter 2

Fiscal stimulus and consumption: Revisiting the "Bonus Renzi" case study

Contents

1 Introduction

Governments would like to smooth out effects of recessions implementing countercyclical fiscal stimulus. Recent researches studied the effects of these stimulus to understand the role of cash on hand. For instance, a number of studies analysed the episodes of tax rebates authorized by the US Congress in the last two downturns of 2001 and 2008 (Johnson et al., 2006; Parker et al., 2013; Misra and Surico, 2014; Shapiro and Slemrod, 2003, 2009; Agarwal et al., 2007; Broda and Parker, 2014; Kaplan and Violante, 2014). Contrary to the predictions of the standard PI-LC model, the response to the fiscal stimulus is not homogeneous across households mainly because of differences in terms of liquidity and debt.

Standard theory predicts consumers to choose optimal consumption based both on current and expected income. If the individual expects a future collapse in the income, she/he will save enough to keep the consumption stable over time, according to the LCH theory (Life Cycle Hypothesis). Friedman (1957) formulates the PIH (Permanent Income Hypothesis), supporting the idea that consumers choose how much to consume mainly observing their permanent income pattern, while transitory income shocks will be spread on the lifetime left. This suggests that the marginal propensity to consume should be equal among consumers and transitory income shocks only slightly alter consumption decision when unexpected. The PIH has been tested exploiting countercyclical fiscal stimulus frameworks, but theory predictions are rarely detected in empirical studies. Thus, researchers conceptualized the idea that households considered different, under various aspects, cannot be expected to react to stimulus in the same way.

Wealth of households and their disposable liquidity were considered a leading element of heterogeneity in consumer response: some examples in Shapiro and Slemrod (2003) which supported the idea that wealth was one of the most powerful predictor of the spending rate; Johnson et al. (2006); Parker et al. (2013) bringing evidence that the consumption response to the rebates in US was larger for households with low liquid wealth or low income.

Kaplan and Violante (2014) introduced a new way of thinking about heterogeneous responses of households to countercyclical fiscal stimulus. They proposed a quantitative framework that considers both liquid and illiquid wealth, rather than net worth alone. Kaplan and Violante (2014) developed a structural economic model where households can hold two assets: a low-return liquid asset (e.g., cash, checking account) and a high-return illiquid asset that carries a transaction cost (e.g., housing, retirement), their model features a consistent number of what they call wealthy hand to mouth consumers, besides the usual small fraction of poor hand to mouth agents with zero net worth. Wealthy hand to mouth hold illiquid assets, yet they optimally choose to consume all of their disposable income during a pay-period. Examining asset portfolio and income data from the 2001 Survey of Consumer Finances through the lens of the two-asset model, Kaplan and Violante (2014) observed 1/3 of US households fitting wealthy hand to mouth profile. This

profile would have not been captured just considering net worth, because these consumers hold no liquid wealth but have significant amounts of illiquid assets on their balance sheets. Kaplan and Violante (2014) showed, through a version of the model parameterized to the 2001 tax rebate episode, that wealthy hand to mouth consumers display larger marginal propensity to consume out of tax rebates than their poor counterparts since they have higher wealth (tied up in the illiquid asset) and, therefore, higher desired target consumption. Kaplan and Violante (2014) showed that this behaviour, called wealthy hand to mouth behaviour, can occur when households face a trade-off between the long-run gain from investing in illiquid assets (assets that require the payment of a transaction cost for making unplanned deposits or withdrawals) and the short-run cost of having fewer liquid assets available to smooth consumption. Such wealthy HtM households are better off bearing the welfare loss from income fluctuations rather than smoothing their consumption. This is because the latter option requires holding large balances of cash and foregoing the high return on the illiquid asset.

Kaplan and Violante (2014) suggested to consider wealthy hand to mouth differently in forecasting the effects of fiscal policies because they have consumption responses that, in many ways, are similar to those of the poor hand to mouth, yet they have demographic characteristics and portfolio compositions that resemble those of the non hand to mouth.

Kaplan et al. (2014) used survey data on household portfolios for the United States, Canada, Australia, the United Kingdom, Germany, France, Italy, and Spain to document the share of wealthy hand to mouth households across countries, their demographic characteristics, the composition of their balance sheets, and the persistence of hand to mouth status over their life cycle.

Misra and Surico (2014), on the heels of Kaplan et al. (2014), quantified the extent to which the estimates of the impact from the homogeneous response model may be inaccurate relative to their heterogeneous model counterparts. They focused on how consumption behaviour varies by household mortgage debt and wealth. They found that the consumption of mortgage-holders responds more strongly to tax credit measures than liquid homeowners. Baker (2018) moreover found that highly-indebted households are more sensitive to income fluctuations and that a one standard deviation increase in debt-to-asset ratios increases the elasticity of consumption by approximately 25%.

We contribute to this recent field of the literature that focused on how consumption behaviour varies by household mortgage debt, wealth and liquidity. To the purpose of our research we exploit a countercyclical tax rebate episode occurred in Italy in 2014, widely know as “Bonus Renzi”. This bonus represents a reduction in the “tax wedge” and, when implemented, was thought as aimed at smoothing out the effects of the economic recession.

We study the effects of this bonus on households consumption aware of the new literature contributions,

trying to capture the heterogeneity in consumer response to the intervention. We investigate the role of different characteristics of households, namely whether they are homeowners and the presence of liquidity constraints and mortgage debt.

This approach highlights the idea that agents response is different because among homeowners, who has a mortgage has different expenditure with respect to other homeowners, moreover the response can be different if you consider also the dimension of illiquidity, which we are going to measure as cash and bank deposits amounting to less than 50 percent of disposable income, and the dimension of mortgage debt.

2 Countercyclical fiscal stimulus

A branch of literature has investigated the response of household consumption to unanticipated shocks. Our research is embedded in the field of household consumption responses to tax rebate episodes.

Johnson et al. (2006); Parker et al. (2013); Misra and Surico (2014); Shapiro and Slemrod (2003, 2009); Agarwal et al. (2007); Broda and Parker (2014) exploited the episodes of tax rebates occurred in the US in 2001 and 2008, where the Treasury scheduled payments based on the last two digit of individual Social Security numbers, which are effectively random. They investigated the change in consumption expenditures caused by receipt of the rebate.

Johnson et al. (2006); Parker et al. (2013) found that household spent 12-40 percent of their tax rebate in nondurable goods during the three-month period in which they received their rebates, moreover the responses are large for households with low liquid wealth or low income.

Shapiro and Slemrod (2003) exploited a survey on how consumers used their 2001 rebate: only 21.8 percent of households report that the income tax rebate of 2001 led them mostly to increase spending. Authors consider wealth holding as one of the most powerful predictors of the spending rate.

Shapiro and Slemrod (2009), using again a survey, found that the aggregate propensity to spend from the 2008 rebate was about one-third, and that there would not be substantially more spending as a lagged effect of the rebates. Because of the low spending propensity, the rebates in 2008 provided low "bang for the buck" as economic stimulus. Putting cash into the hands of the consumers who use it to save or pay off debt boosts their well-being, but it does not necessarily make them spend. Low-income individuals were particularly likely to use the rebate to pay off debt. Misra and Surico (2014) highlighted the importance of heterogeneous response. Applied to the 2001 and 2008 US economic stimulus payments, they have shown that a heterogeneous response model can provide a significantly different evaluation of the impact of large public programs on the aggregate economy as well as on the different groups of society.

Agarwal et al. (2007): studied the 2001 Federal income tax rebates, finding that, on average, consumers initially saved some of the rebate, by increasing their credit card payments and thereby paying down

debt. But soon afterwards their spending increased, counter to the canonical Permanent-Income model. Spending rose most for consumers who were initially most likely to be liquidity constrained, whereas debt declined most (so saving rose most) for unconstrained consumers. More generally, the results suggestion was that there can be important dynamics in consumers' response to "lumpy" increases in income like tax rebates, working in part through balance sheet (liquidity) mechanisms.

Broda and Parker (2014) exploited a survey of households in the Nielsen Consumer Panel and the randomized timing of disbursement of the 2008 Economic Stimulus Payments, they find that a household's spending rose by ten percent the week it received a Payment and remained high cumulating to 1.5-3.8 percent of spending over three months. The effect smooths quarter after quarter. Spending is concentrated among households with low wealth or low past income.

Jappelli and Pistaferri (2014) studied households consumption upon unexpected transitory income change. They found that the marginal propensity to consume (MPC) is 48 percent on average and they also found substantial heterogeneity in the distribution, as households with low cash-on-hand exhibit a much higher MPC than affluent households.

Other models with heterogeneous response of agents have been proposed: Huggett (1996) compared the age-wealth distribution produced in life-cycle economies to the corresponding distribution in the US economy; Aiyagari (1994) presented a qualitative and quantitative analysis of the standard growth model modified to include precautionary saving motives and liquidity constraints, he addressed the impact on the aggregate saving rate, the importance of asset trading to individuals, and the relative inequality of wealth and income distributions; Campbell and Mankiw (1989) proposed that the time-series data on consumption, income, and interest rates are best viewed as generated not by a single representative consumer but by two groups of consumers. Half the consumers are forward-looking and consume their permanent income, but are extremely reluctant to substitute consumption intertemporally. Half the consumers follow the "rule of thumb" of consuming their current income.

Spender saver models have been used to shed light on cases of economic difficulties: Galí et al. (2007) extended the standard new Keynesian model to allow for the presence of rule-of-thumb consumers.[1] They showed how the interaction of the latter with sticky prices and deficit financing can account for the existing evidence on consumption rises in response to an increase in government spending; Eggertsson and Krugman (2012) presented a simple new Keynesian-style model of debt driven slumps-that is, situations in which an overhang of debt on the part of some agents, who are forced into rapid deleveraging, is depressing aggregate demand. Krusell and Smith (1997); Carroll et al. (2014) combined the spender-saver

[1]Rule-of-thumb households are assumed to behave in a "hand to mouth" fashion, fully consuming their current labor income. They do not smooth their consumption path in the face of fluctuations in labor income, nor do they intertemporally substitute in response to changes in interest rates.

insight of heterogeneity in patience with a standard one-asset incomplete-markets model.

The point of view in analysing the response of consumers to tax rebate experienced a significant change when Kaplan et al. (2014) argued against spender saver models for not capturing the presence of what they call wealthy hand to mouth consumer: households holding sizable amounts of wealth in illiquid assets, such as housing or retirement accounts but have very little or no liquid wealth, and as a result consume all of their disposable income every period. Clearly, such households would not be picked up by standard measurements since they have positive -and often substantial- net worth.[2] They find out that wealthy hand to mouth consumers have a high marginal propensity to consume out of transitory income changes. Kaplan and Violante (2014) developed a structural economic model where households can hold two assets: a low-return liquid asset (e.g., cash, checking account) and a high-return illiquid asset that carries a transaction cost (e.g., housing, retirement account). They documented the existence of wealthy hand to mouth households in data from the Survey of Consumer Finances. A version of the model parameterized to the 2001 tax rebate episode yields consumption responses to fiscal stimulus payments that are in line with the evidence, and an order of magnitude larger than in the standard "one-asset" framework. They sustained model's nonlinearities with respect to the rebate size and the prevailing aggregate economic conditions, thus having implications for policy design. The evidence of Kaplan and Violante (2014); Kaplan et al. (2014) was supported by Cloyne and Surico (2017), they showed, using a narrative approach, that their results are strongly suggestive of the notion that tax cuts affect consumption mostly by relaxing liquidity constraints for indebted households.

Another dimension to Kaplan and Violante (2014); Kaplan et al. (2014) was brought by Misra and Surico (2014) that analysed the response of the US economy to the 2001 and 2008 income tax rebates; their model allows, although not requiring, heterogeneity among consumer responses to the stimulus. Results show that the consumption responses to the tax rebates is highly heterogeneous, with 40 percent to 50 percent of households spending an amount not statistically different from zero. Another 20 percent consume significantly more than half of the rebate, with the remaining families somewhere in between. The heterogeneity is concentrated in "gas, motor fuel, public transportation," "health," "apparel," and a handful of observations in "new vehicle."The households who spend most of the fiscal payment typically hold a mortgage and have higher income whereas renters with lower income tend to spend between 10

[2]The poor hand to mouth (poor HtM), those who hold little or no liquid wealth and no illiquid wealth; and the wealthy HtM, who also hold little or no liquid wealth but have significant amounts of illiquid assets on their balance sheets. Just like the poor HtM households, wealthy HtM households have a large marginal propensity to consume out of small transitory income fluctuations. However wealthy HtM households are more similar to non-HtM households along many other important dimensions. As a result, the wealthy HtM cannot be fully assimilated into either group. Rather, they are best represented as a third, separate class of households

and 40 cents for each dollar of rebate. They included an additional element in heterogeneity, not just linked to liquidity, but also to mortgages-holders response.

Acconcia et al. (Forthcoming) exploited the quasi-experiment nature of public programs in support of homeowners residing in earthquake areas. Homeowners receive funds strictly tied to reconstruction work, they are in part disbursed upfront, leading to significant variation in cash-on-hand. They found that consumption by liquid homeowners in the disaster area, who are eligible to reconstruction funds, is no different from that by homeowners outside the disaster area. By contrast, the consumption by illiquid households rises quite markedly. Supporting the existence of a heterogeneous behaviour among homeowners which is strictly connected to liquidity.

Heterogeneity in consumption elasticity of households has been also examined by: (i)Surico and Trezzi (2018) showing that a tax hike on the main dwelling leads to large expenditure cuts among mortgagors, who hold low liquid wealth despite owning sizable illiquid asset, in contrast, higher tax rates on other residential properties affect affluent households, thereby having a modest impact on their consumer spending; (ii) Baker (2018) testing consumption elasticities across households with varying levels, and types, of debt, he found that heterogeneity in consumption elasticity can be explained entirely by credit and liquidity; (iii) Mian and Sufi (2014) examining the effect of rising US house prices on borrowing and spending from 2002 to 2006, they found strong heterogeneity in the marginal propensity to borrow and spend. Households in low income zip codes aggressively liquefy home equity when house prices rise, and they increase spending substantially. In contrast, for the same rise in house prices, households living in high income zip codes are unresponsive, both in their borrowing and spending behaviour.

3 The 2014 Italian tax rebate

Our study relates to the art. 1 of the D.L. 24/04/2014 n. 66, *Emergency measures for competitiveness and social justice*, which introduced a 640 euro tax rebate on employees compensation from May to December 2014, named "Bonus Renzi".

This measure was embedded in a wider framework of emergency measures aimed at boosting economy. Notably, this rebate was intended to reduce the tax wedge for employees and assimilated workers. It is worth saying that this rebate does not contribute to the taxable income and is directly received from beneficiaries in their paychecks, thus increasing their salary of 80 euro per month.

The rebate amounts to 640 euro if the employee income is between 8,145 and 24,000; if the income is between 24,000 and 26,000 the amount reduces.[3] The rebate is also proportional to the working days in the calendar year, meaning that there is variation in the amount of the rebate among households with

[3] In this case the bonus is calculated as follows: $\frac{(80*26{,}000-income)}{2{,}000}$

equal income.

The Government estimated the entire operation of being around 5.9 billions, equivalent to 0.5 per cent of household disposable income and 0.4 of Italian GDP.

The tax rebate became structural and amounted to 960 euro with the stability Law 23/12/2015 n. 190. The rebate in 2014 rose a crucial issue since it was distributed according to the 2014 income, which became certainly known only in 2015, thus in 2014 was not certain the eligibility status of beneficiaries. This uncertainty in the eligibility status, strictly connected with 2014 income, materialized in 1.5 million *wrong* beneficiaries forced to return the bonus in 2015. Moreover, since the bonus is also linked to the number of days worked, households that lost their job in 2014 had to repay part of the bonus received in the months they were employed.

The "80 euro" policy, as called by the press, has been largely discussed in various articles on "*La voce*". Following some examples:

Gagliarducci and Guiso (2015) presented a Regression Discontinuity Design, implemented with the data of IRS and ISTAT. They analysed the effect of a change in consumption among individuals immediately below and above the lower income threshold of 8,145 euro (the minimum income required to receive the bonus), moreover they standardized the income to take into account beneficiaries working less than 365 days. They showed evidence of a strong effect of the bonus on nondurable consumption, even stronger for food. They concluded that on average 60 euro per month of the rebate were spent in food.

Baldini et al. (2014) showed the categories of possible beneficiaries of the bonus; they sustained that the bonus benefited more middle class families, which usually have employed components, and women, which have generally low income jobs.

Pinotti (2015) rose critics to the vision of Gagliarducci and Guiso (2015), presenting an approach in which is computed the average household expenditure for income bins and making a comparison for bins close to the cutoff. He showed an increase of average perceived bonus when the income goes above the 8,145 euro cutoff, but, the average household expenditure does not increase at the same cutoff. He suggested caution in interpreting any change in consumption as evidence of bonus effects on family consumption, especially because households may have perceived the bonus as transitory. The "80 euro" policy was also studied by Neri et al. (2017), they used the panel component on the Survey of Household Income and Wealth. They found that households that received the tax rebate increased their monthly consumption of food and means of transportation by about 20 and 30 euro per month, respectively. There was a larger increase for households with low liquid wealth or low income.

4 Data and empirical strategy

Our study bears on the biannual Bank of Italy's Survey of Households' Income and Wealth (SHIW). The survey contains detailed information on consumption, disposable income, housing tenure status, employment status, education. In 2015 the Survey was conducted for 2014 and covered 8,156 households. In this case it was inserted a section of questions in which respondents were asked how many people in their family were "Bonus Renzi" beneficiaries in 2014, the total amount per month received and a personal judgement on how they mainly used their bonus among: consumption, savings, and repayment of debt.
In our study we want to exploit heterogeneity across consumer responses to the stimulus. Following the literature we treat separately households with and without homeowners. Moreover, among homeowners liquidity constraint condition and mortgage status are investigated separately, following Kaplan and Violante (2014); Misra and Surico (2014); Acconcia et al. (Forthcoming).
We define illiquid homeowners who, before the bonus (at the beginning of 2013): (i) held liquid assets (cash and bank deposits) amounting to less than 50 percent of their disposable income and (ii) had a mortgage.
We restrict our sample to 2012 and 2014 data and we first estimate the following difference-in-differences specification, considering first the sample of liquid homeowners and then the sample of illiquid homeowers:

$$\Delta C_{i,t} = \alpha + \beta_1 Bonus_{i,t} + \beta_4 \Delta Income_{i,t} + \beta_5 Z_{i,t} + \epsilon_{i,t} \tag{1}$$

where $\Delta C_{i,t}$ is the two-year growth rate of: consumption for food, consumption for other nondurable goods, and the sum of consumption for food and other nondurable goods. $Bonus_{i,t}$ is a dummy taking value one if the household has at least one member being bonus beneficiary in 2014; Z_{it} is a set of controls including the householder main employment, age, education level, branch of activity, occupational status, residence area. We present two models for each dependent variable, in one specification we have the two-year growth rare of net disposable income ($\Delta Income_{i,t}$) among controls and in the other we exclude this control.
When we consider the sample of liquid homeowners, the coefficient β_1 indicates the change in consumption of liquid homeowners that have benefited from the rebate, after the rebate was implemented; the control group consists of liquid homeowners non bonus beneficiary. A similar definition applies for the sample of illiquid homeowners.
Table 1 and Table 2 present results of the difference-in-differences model in equation 1, which allows us to estimate the effect of the bonus on households consumption. We consider only homeowners and the sample is split according to liquidity status. The left-hand side is respectively the two-year change of consumption for food, consumption for other nondurable goods, and the sum of consumption for food

and other nondurable goods.

Table 1: Bonus effects: sample of liquid homeowners

	(1)	(2)	(3)	(4)	(5)	(6)
	Food	Food	Other nondurable	Other nondurable	All nondurable	All nondurable
Bonus	482.2*	477.5*	466.5	459.1	948.7	936.7
	(2.21)	(2.22)	(0.96)	(0.95)	(1.83)	(1.84)
$\Delta Income$		0.0452***		0.0717***		0.117***
		(5.81)		(3.64)		(5.13)
N	2,410	2,410	2,410	2,410	2,410	2,410
Illiquid	No	No	No	No	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Table reports results of empirical specifications having the two-year change of liquid homeowners nondurable consumption for food, consumption for other nondurable goods, and the sum of consumption for food and other nondurable goods, on the left-hand side. *Bonus* is a dummy taking value one if the household has at least one member being bonus beneficiary in 2014; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 1 shows a positive and significant impact of the bonus on consumption for food, while consumption for other nondurable goods has not been affected by the bonus.

The impact shown is an increase in consumption for food in 2014 of 477.5 euro, almost 75% of the bonus, among liquid homeowners, thus among households we consider as wealthy and moreover as being not credit constrained.

Table 2: Bonus effects: sample of illiquid homeowners

	(1)	(2)	(3)	(4)	(5)	(6)
	Food	Food	Other nondurable	Other nondurable	All nondurable	All nondurable
Bonus	-503.9	-524.0	-256.8	-338.6	-760.6	-862.6
	(-1.40)	(-1.47)	(-0.28)	(-0.37)	(-0.78)	(-0.92)
$\Delta Income$		0.0287^{**}		0.117^{***}		0.145^{***}
		(2.95)		(4.67)		(4.64)
N	656	656	656	656	656	656
Illiquid	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Table reports results of empirical specifications having the two-year change of illiquid homeowners nondurable consumption for food, consumption for other nondurable goods, and the sum of consumption for food and other nondurable goods, on the left-hand side. *Bonus* is a dummy taking value one if the household has at least one member being bonus beneficiary in 2014; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

Table 2 shows a non significant impact of the bonus on consumption for food and other nondurable goods, among illiquid homeowners, thus among households we consider as wealthy and moreover as being credit constrained.

Table 3 presents results of the difference-in-differences model in equation 1, which allows us to estimate the effect of the bonus on households consumption. We consider only homeowners and the sample is split according to liquidity status. The left-hand side is the two-year change of consumption for food, distinguishing consumption for food at home and consumption for food outside home.

Table 3: Bonus effects on homeowners food consumption

	(1)	(2)	(3)	(4)
	Home-Food	Non-Home-Food	Home-Food	Non-Home-Food
Bonus	490.9**	-13.37	-164.3	-359.7
	(3.09)	(-0.11)	(-0.71)	(-1.67)
$\Delta Income$	0.0330***	0.0122***	0.0226***	0.00605
	(5.10)	(4.29)	(3.78)	(1.25)
N	2,410	2,410	656	656
Illiquid	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Note: Table reports results of empirical specifications having the two-year change of homeowners nondurable food consumption, at home or outside home, on the left-hand side. The first two columns identify liquid homeowners, the second two columns identify illiquid homeowners. *Bonus* is a dummy taking value one if the household has at least one member being bonus beneficiary in 2014; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

It is clear from Table 3 that the change in consumption for food analysed previously is almost entirely concentrated in food consumed at home. Still no significant effect for the sample of illiquid homeowners. The second model is a difference-in-differences model, which allows us to estimate the effect of the bonus on household consumption, allowing for heterogeneous responses depending on households level of mortgage. The sample is split according to housing and liquidity status. The left-hand side is the two-year change of home durable consumption:

$$\Delta C_{i,t} = \alpha + \beta_1 Bonus * Debt_{i,t} + \beta_4 \Delta Income_{i,t} + \beta_5 Z_{i,t} + \epsilon_{i,t} \tag{2}$$

where $\Delta C_{i,t}$ is the two-year growth rate of home durable consumption (e.g. furniture, appliance), $Bonus_{i,t}$ is a dummy taking the value of one if the household had at least on bonus beneficiary in 2014; $Debt_{i,t}$ is the amount of mortgage debt the household i has at time t; $Bonus * Debt_{i,t}$ is the interaction between the bonus status and the amount of mortgage debt of household i at time t; $\Delta Income_{i,t}$ is the two-year growth rare of net disposable income; Z_{it} is the previously specified set of control in 1.

In Table 4 we propose this model for three group of consumers: illiquid homeowners, liquid homeowners, non homeowners.

The coefficient of $Bonus * Debt$ in Table 4, first column, indicates the change in consumption of illiquid homeowners that have benefited from the rebate and have a level of mortgage debt different from zero; the coefficient of $Bonus * Debt$, in the second column, indicates the change in consumption of liquid homeowners that have benefited from the rebate and have a level of mortgage debt different from zero; the

coefficient of $Bonus * Debt$, in the third column, indicates the change in consumption of non-homeowners that have benefites from the rebate and have a level of mortgage debt different from zero.

Table 4: Bonus effects on home durable consumption.

	(1)	(2)	(3)
	ILLIQUID	LIQUD	OTHERS
Bonus*Debt	186.8**	50.09	1.840
	(2.84)	(0.73)	(0.02)
Bonus	-318.1	182.8	-56.15
	(-1.43)	(1.25)	(-0.56)
Debt	-18.14	-55.82	4.975
	(-1.52)	(-1.58)	(0.06)
$\Delta Income$	0.00204	0.00397	0.00856
	(0.51)	(0.94)	(1.64)
N	672	2,552	1,234
Owners	Yes	Yes	No
Controls	Yes	Yes	Yes

Note: Table reports results of empirical specifications having the two-year change of home durable consumption on the left-hand side. *Bonus* is a dummy taking the value of one if the household had at least one bonus beneficiary in 2014; *Debt* is the amount of mortgage debt of the household; $Bonus * Debt$ is the interaction term; $\Delta Income$ is the two-year growth rare of net disposable income; *Controls* include the householder main employment, age, education level, branch of activity, occupational status, residence area. Significance levels: $^{*} < 10\%$ $^{**} < 5\%$ $^{***} < 1\%$. t statistics in parenthesis.

In Table 4 results confirm the idea that considering both mortgage debt, liquidity and housing status is crucial in studying the response of households consumption to countercyclical fiscal stimulus. In particular, results clearly show that among illiquid homeowners the effect on home durable consumption, due to the bonus, is almost null when the mortgage debt is close to zero, while the effect reaches 187 euro—statistically significant—when it is considered an illiquid homeowner with ten thousand euro mortgage debt. The effect is not statistically significant, instead, among liquid homeowners and non-homeowners, even when we consider a relatively high level of mortgage debt.

5 Conclusion

The effect of the "Bonus Renzi" has been already investigated:

- Gagliarducci and Guiso (2015) presented a Regression Discontinuity Design, they showed evidence of a strong effect of the bonus on non home durable consumption, even stronger for food. They concluded that on average 60 euro per month of the rebate were spent in food.

- Neri et al. (2017) found that households that received the tax rebate increased their monthly consumption of food and means of transportation by about 20 and 30 euro per month. There was a larger increase for households with low liquid wealth or low income.

To summarize, our evidence replicates the result by Gagliarducci and Guiso (2015) that the bonus stimulated food consumption and adds to this conclusion the suggestion that the effect is completely due to liquid homeowners. Moreover, we also provided evidence that illiquid homeowners characterized by relative high level of debt, instead, increased their spending for home durable goods. Thus the entire bonus seems to have stimulated spending for home goods. We did not find evidence that spending increment has been larger than the amount of the bonus.

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