CAR DEALERSHIP MARKUPS

An empirical analysis of factors affecting the markup on car models in the United States

Author: Philip Svärd
Supervisor: Håkan Jerker Holm
Spring semester 2022
Lunds Universitet
Nationalekonomiska institutionen

Abstract

The scope of this analysis is to evaluate what may affect the percentage markup on new and used cars sold by dealerships across the United States. The essay will also take into account shocks to market demand and supply as relevant factors that may affect markup. Vertical pricing theory is applied to study what kind of relationship exists between the upstream firm (manufacturer) and the downstream firm (dealership) when it comes to pricing and markups. To study what factors might have an effect on markup an ordinary least squares regression has been used. Some important conclusions can be drawn from this. Car type seems to have a significant effect on markup. The manufacturer is also a relevant factor in the size of the markup. Arbitrage opportunities are also indicated by having a smaller markup if the car is new.

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1. Introduction

1.1. Background

The car market in the United States is characterised by a separation between the manufacturer and the dealerships where consumers acquire the cars. This is due to well established state franchise laws that limit or prohibit direct sales from the manufacturer to consumer. This is to further competition and increase the service level offered to the consumer (Kristy Hartman, 2021). This then means that manufacturers and the dealerships will have to negotiate and agree on a sales price to consumers to benefit both branches.

Additionally, the U.S car market accounts for 3% of the Gross Domestic Product (GDP) and sold around 15 million vehicles during 2021 (Carlier, 2022). With that said it is an important market both for the consumers that may need a means of transportation as well as the dealerships and manufacturers.

Consumers have many brands, models, trim levels and, vehicle types to choose from. They can also decide if they want to purchase a brand-new car or a used car that may be better value since the general notion is that used cars are cheaper.

The car market in USA is interesting to research at this moment due to shocks in both demand and supply. Demand has been impacted positively due to stimulus checks offered to individuals and increased optimism whereas supply has been affected negatively as a result of production issues and component shortages.

1.2. Research Question and Scope

The scope of this essay is to analyse factors that affect the markup on new and used cars that are listed in the United States. Markup is considered to be the difference between the recommended retail price (MSRP) and the actual list price. It is also to study how vertical pricing is being used in practice and in what ways it may not be used. The research question is:

What factors affect the size of the markup in car prices?

To analyse this question, a vertical pricing model will be used. There will also be a regression analysis with cross-sectional data over markups and different variables that affect it. The data will be used for an ordinary least squares regression (OLS) that gives each variables' individual effect on the markup.

1.3. Limitations

The essay has been limited to cars produced no earlier than 2020 as the phenomenon that will be explained is specific for relatively new cars. It is also because some of the discussion will focus on demand and supply side issues due to covid and thus the limit on the time frame. Another limitation that has been chosen is to collect data for the 25 most sold models last year as the demand for these cars is the highest and hence the data will be more representative of the general car market.

1.4. Disposition

In Chapter 2, relevant economic theory on vertical pricing is presented. Some background on the car market in USA is also discussed as well as its relation to vertical pricing. In Chapter 3, the data collection methods are explained along with an explanation of the variables used in the regression model. Descriptive statistics for the variables are also shown. Chapter 4 includes the empirical approach with hypothesis testing to lay grounds for the regression. Chapter 5 contains the regression results as well as an analysis of them. Furthermore, in Chapter 6, the regression results are discussed in relation to the theory. Lastly, in Chapter 7, there is a presentation of some concluding remarks.

2. Theory and the market for new and used cars in

2.1. Vertical Pricing

Vertical pricing is when the manufacturing firm of a good does not sell this good to the end consumer as a first party but instead sells the good via a retailer. The manufacturer and the retailer then have a contract that dictates the price the retailer can charge and or other specific rules for being able to sell that product (Lynne Pepall, 2014). The imposition from the manufacturer (upstream firm) on the retailor (downstream firm) is usually done by an RPM (Resale Price Maintenance) agreement. The RPM dictates a maximum or a minimum price that retailors can charge. These types of agreements were illegal for a long time in USA but have sequentially become more legal over time by different court rulings. With the first court case that made an exemption to the antitrust policies being the Colgate case of 1919. The court ruled that as long as the upstream firm informed the downstream firms that they would shut down any downstream firm that sold below the RPM price, they could set a minimum price. Over time more court cases have opened up the legislation. The most recent case, the Leegin case of 2007 ruled that all RPM agreements should withgo a rule of reason test to establish if they violate antitrust policy or not (Lynne Pepall, 2014).

2.2. Double-marginalisation

The vertical pricing model may also be a solution to double-marginalisation. A double-marginalisation problem arises when the market is characterised by imperfect competition. Consider a market with linear demand:

$$P^D = A - BQ$$

The upstream firm is assumed to have constant marginal cost (equal to c) and sells to a retailor with marginal cost equal to the upstream price *Pu*. Given that the downstream firm only has a cost consisting of the price it buys the good from the upstream firm, the downstream firm maximises profit by setting the price to:

$$P^D = \frac{A + P^U}{2}$$

But, if the upstream firm wants to make a profit, *Pu* must have a markup *m* such that:

$$P^U = c + m$$

And so, the downstream price will be:

$$P^D = \frac{A + c + m}{2}$$

Even though the profit maximising price for the upstream firm and downstream firm combined will be:

$$P^{D*} = \frac{A + c}{2}$$

So, a double-marginalisation issue is prevalent since the downstream price is higher than the combined profit maximising price (Lynne Pepall, 2014). An RPM agreement can be used to deal with this issue. The RPM agreement can be used to set a maximum price for the downstream firm by the upstream firm that is equal to the combined profit maximising price:

$$P^{D*} = \frac{A + c}{2}$$

What can be noted by this is that P^{D*} is not only the profit maximising price but it is also a lower price than what would be if no RPM agreement existed. Hence, the RPM agreement benefits the upstream firm, the downstream firm and, the consumers (Lynne Pepall, 2014).

2.3. RPM and service-level

On the flipside of a maximum price set to deal with double-marginalisation, RPM agreements can be used to increase the service level offered to consumers by setting a minimum price. An explanation for a price floor on is that dealerships do not compete on price but rather compete on the level of service to the customer. This may overcome the fact that service is costly and usually the entire cost for it falls on the retailor meaning that without a retail price agreement in place the service level would decrease to or close to zero. An increase in the service level will increase the profits for both the upstream firm as well as the downstream firm, and at the same time make the consumers better off. Mainly because an increase in service level increases the willingness to pay for the marginal consumer. Consider a demand function of a good at price *p* with service level *s* as *D(p,s)*. An increase in service level increases the willingness to pay for the marginal consumer and thus the demand for the good. It is also assumed that the demand curve with this effect may look like this:

$$Q(p,s) = s(A-p)N$$

Where *Q* is the quantity demanded, *N* is the number of customers. Solving for price gives:

$$p = A - \frac{Q}{sN}$$

Which means that the maximum price someone is willing to pay for the good is A regardless of the level of service. However, a larger quantity is purchased as the level of service increases. Now assume that the cost of supplying *s* is described by a function $\varphi(s)$ and that it is characterised by diminishing returns. So, increasing *s* increases the cost of providing *s*. Hence, the retailors marginal cost of selling the upstream firm's good is $r + \varphi(s)$ which the wholesale price *r* and the cost per unit of level of service $\varphi(s)$. This can be described in figure 1.1. As level of service increases from S1 to S2, the demand curve rotates up and to the

right. Thus, increasing total output from Q1 to Q2 and with it social surplus becomes areas C and E.

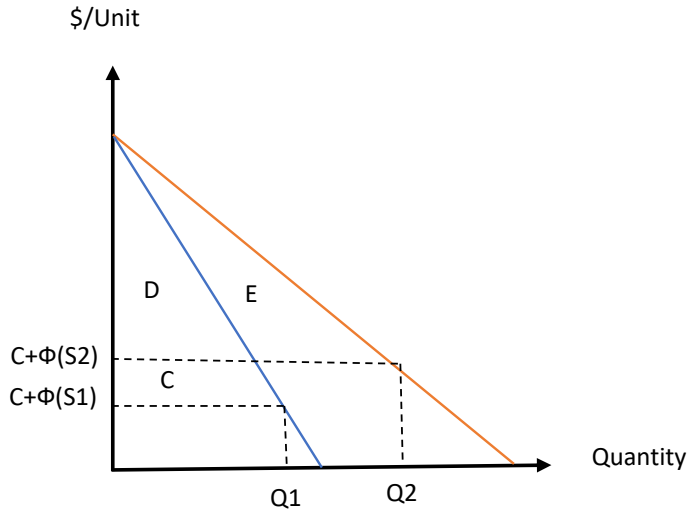

Figure 1.1: Service level effect on demand

Since it is beneficial for all parties with an increased level of service a retail price agreement is put in place (Lynne Pepall, 2014).

2.4. The Car market in USA

As mentioned before, the car market in USA is a large domestic market accounting for 3% of GDP. It is also separated into a vertical structure through state antitrust legislation with the ability for the upstream firm to impose RPM agreements on the dealerships. The market is also characterised by imperfect competition due to high barriers to entry both as a manufacturer and a dealership. Since there are large fixed costs in starting either. Additionally, around 15 million vehicles were sold in 2021 and 8,8 million vehicles produced in 2020. However, compared to production in 2019 at 10,9 million units, it is a 19% drop in 2020 (Ariella, 2022). In the years 2020 up until now there have been macroeconomic effects on both supply and demand. Supply has shifted to the left due to a shortage in important

components for the manufacturing of various car models such as semiconductors. A form of microchip that is used in all new vehicles' ECUs and dashboard appliances (Oxford Analytica, 2022). There have also been other supply chain issues due to the covid crisis or caused by the beached cargo ship in the Suez Canal. Even though it may merely be a short-term shock it is likely to have long-term consequences if the shortage continues. Mainly in the form of decreased production, and increased prices. Some even predict the shock can continue well into 2022 (Williams, 2021). Consumer demand has on the other hand shifted to the right now towards the end of the covid crisis since individuals are now able to dispose of their income and have a higher willingness to do so as indicated by a growth in real GDP in USA in 2021 primarily due to increased personal consumption, private inventory investments and nonpresidential fixed investments (Analysis, 2022).

2.5. The Car Market and Vertical Pricing

The vertical separation of car manufacturers from car dealerships enables a vertical pricing structure via RPM agreements. The manufacturer sets a "manufacturer suggested retail price" (MSRP) that dealerships are expected to follow when pricing their new cars. The MSRP that is set follows the optimality condition from before where $P^{D*} = \frac{A+C}{2}$ so that it maximises both the upstream firm's and the downstream firm's combined profit. It is also a possibility that the MSRP is set above the optimal level to increase the provision of service to the customer. This is so dealerships will not compete on price with one another but rather on the service level provided. However, the MSRP is only a recommended price and dealerships may set other prices if they like to some degree but manufacturers may take punishing actions according to the state antitrust legislature. These actions may include a stop on sales to certain dealerships that do not abide (Kristy Hartman, 2021). The manufacturer Ford have threatened dealerships with this action due to significant markups on their new model, the F150-lightning. Andrew Frick, the Ford Vice President of sales stated "It has come to our attention that a limited number of dealerships are interacting with customers in a manner that is negatively impacting customer satisfaction and damaging to the Ford Motor Company brand and Dealer Body reputation. These actions are perceived as threatening customers by withholding their opportunity to convert reservations to orders. This behaviour is not

allowable.”. As well as stating “If it is determined that your dealership is engaging in such practices, Ford Motor Company reserves the right to redirect that dealerships allocation of the F-150 Lightning.” (Santos, 2022). It is likely that more manufacturers may take a similar approach if they reason similarly to Ford, that it hurts their brand image if consumers are worse off.

3. Data

3.1. Data Collection

The data have been collected in an excel sheet during a weeks’ time for car models from the years 2020-2022. The models have been chosen based on the 25 bestselling models according to (Caparella, 2022) as this gives the best representation of a general trend. Data on price, mileage, vehicle type, and vehicle brand have then been compiled from (Cars.com, 2022) on car listing all over USA. Note that it is only the listing price and not the actual sales price that is being investigated here. This can be a limiting factor as there is usually a negotiation between the customer and the salesman at the dealership. Meaning that it is usually not the sticker price that actually ends up being the sales price. But it should still show a general trend of what factors affect the markups. Furthermore, a third site has been used to determine the MSRP for the chosen models and with the most popular trim levels (Takashi, 2022).

3.2. Variables

Dummy variables are helpful when analysing a categorical effect on the regression. For example, if the vehicle is an SUV, or a pickup truck. Otherwise stated as a numerical replacement that can take the value 0 or 1 for a qualitative fact in a regression (Draper & Smith, 1998). There has been a use for dummy variables for the vehicle type and the vehicle brand. The dummy group for vehicle type includes “SUVs”, “Trucks” (pickup), and excludes

"Sedans" as this is the control variable for this group. "Sedan" is chosen to be the control variable for this group with the reasoning that it is a more common car type in Sweden than the other car types. The dummy group for vehicle brands includes "Honda", "GM", "Ford", "Nissan", "Toyota", "Hyundai", and "FCA" while excluding "Others". The same reasoning goes for excluding "Others" from this group as can be seen from section 3.3 that this manufacturer group includes brands that only have a few data points each compared to the other brands.

3.3. Car Type and Car Group Specification

The car type classification has been gathered from (Cars.com, 2022) as it states the type in the listings. The car manufacturer groups and the brands they produce are specified as follows:

Honda: Honda, Acura

GM: Chevrolet, Holden, Vauxhall, Cadillac, Opel, GMC, Wuling Motors, Baojun, Buick

Ford: Ford, The Lincoln Motor Company

Nissan: Nissan, Infiniti, Datsun

Toyota: Toyota, Lexus, Daihatsu

Hyundai: Hyundai, Kia

FCA: Chrysler (Ram, Jeep, Dodge), Fiat (Lancia, Alfa Romeo, Maserati)

Others: Subaru, Mazda, Tesla

3.4. Variable Specification

With the dummy variables specified above, this leaves the specification of the three other important variables:

MSRP: The MSRP in thousands of USD (United States Dollar)

Price: The list price in thousands of USD

Mileage: Thousands of miles

New: Dummy variable for if a car is new or not. New=1, used=0

Markup: Precented as a percentage of $\frac{Price-MSRP}{MSRP} = Markup$

3.5. Descriptive Statistics

Variables	Mean	Median	STD. Deviation	Min	Max	Number of observations
Markup	34,529	31,988	20,075	-82,007	147,430	525
MSRP	39,941	37,5	12,664	21,550	79,455	525
Mileage	4,0943	0,024	7,292	0	49,617	525
SUV	0,600	1	0,490	0	1	315
Truck	0,200	0	0,400	0	1	105
Honda	0,160	0	0,367	0	1	84
GM	0,118	0	0,323	0	1	62
Ford	0,120	0	0,325	0	1	63
Nissan	0,040	0	0,196	0	1	21
Toyota	0,240	0	0,427	0	1	126
Hyundai	0,040	0	0,196	0	1	21
FCA	0,120	0	0,325	0	1	63
New	0,490	0	0,325	0	1	257

Table 1.1.: Descriptive Statistics

4. Empirical Approach

In the following chapter, the empirical approach chosen to test the research question is presented. There will be one ordinary least squares (OLS) regression presented as well as a few tests testing for heteroskedasticity and multicollinearity.

4.1. Factors that Affect the Markup

For the data collected, the following regression model will be used:

$$Markup_i = \beta_1 + \beta_2 MSRP_i + \beta_3 Price_i + \beta_4 Mileage_i + \gamma_1 SUV_i + \gamma_2 Truck_i + \gamma_3 Honda_i + \gamma_4 GM_i + \gamma_5 Ford_i + \gamma_5 Nissan_i + \gamma_6 Toyota_i + \gamma_7 Hyundai_i + \gamma_8 FCA_i + \gamma_9 New_i$$

The scope is thus to study what factors based on the data collected may affect the markup and in what way. In the regression β_1 is the constant and the other β variables describe the relationship to the percentage markup. The dummy variables for car type and car brand are interesting as it helps to study differences in markup between types of vehicles and brands. All variables are tested with the null hypothesis of the coefficient being zero and if the null is rejected it cannot be overlooked that the variables have an effect.

4.2. Tests

To determine if the regression stated in 4.1 is specified correctly, a few tests will be used. The tests are done using an econometrics software *Gretl*. Firstly, the variables will be tested for multicollinearity using a Variance Inflation Factor (VIF). Secondly, there will be a test for the normality of the residuals to see if the residuals follow a normal distribution. Lastly, there will be a test for heteroskedasticity in the error terms by using a Breusch-Pagan test.

4.2.1. Multicollinearity

If multicollinearity is present in a regression model it may lead to inaccurate coefficient results. Multicollinearity is when the explanatory variables are correlated with one another and often leads to large standard errors in the variables. There is rarely a model where the explanatory variables are completely uncorrelated but if the correlation is too large it may make the results inaccurate. Although multicollinearity does not bias the results directly, if there is a large degree of multicollinearity the regression may have a better result if some variables are omitted (Belsley, 1991). Therefore, a VIF test is used to determine the level of correlation between the explanatory variables. The motivation for performing this test is that one could imagine that perhaps the list price and the MSRP would be correlated or for example Ford and Truck since that is their most sold vehicle. The VIF is defined as:

$$VIF = \frac{1}{1 - R_j^2}$$

Where VIF measures how much of the variance of a β_i in the regression is increased due to collinearity. R_j^2 is the R^2 for the regression but not including in this case Markup's response. If the VIF>10 for any given explanatory variable it can be said that this variable should be omitted from the model (Kutner, et al., 2004). In this regression model there are no clear signs of large multicollinearity as the largest VIF is for Truck at 2.48 and the lowest being 1.55 for Mileage. All values are below the threshold of 10.

4.2.2. Normality of the Residuals

Normality in the residuals is important for a regression because if normality is absent, the regression may not be used to deduct accurate results from any test involving the normal distribution curve. However, if the number of observations N is large the residuals are usually approximately normally distributed (Portney, 2000). As N for the data is large (525) and the residuals appear to be approximately normally distributed according to the test found in the appendix. This is what will be assumed.

4.2.3. Heteroskedasticity

Heteroskedasticity could pose issues to an OLS regression because a regression is assumed to follow the Gauss-Markov assumption. Meaning that the error terms are homoscedastic. If this is not the case, and the error terms are heteroskedastic this means that the standard errors and any inference conducted on these standard errors will be biased. Ultimately, hypothesis test results may be incorrect. To test for heteroskedasticity, a Breusch-Pagan test is used (White, 1980). With the test statistics for the Breusch-Pagan test found in the appendix, the null hypothesis of the error terms being homoscedastic can be rejected. However, this is not a reason to throw out the results from the regression model as the coefficients still remain unbiased. But robust standard errors are used in the regression as a remedy for heteroskedasticity (Fox, 1997).

5. Results and Analysis

5.1. Factors Affecting Markup

Variables	Coeff	P-value
Const	35,445***	1,1E-122
Mileage	-0,342***	0,0005
SUV	-6,541***	6,10E-06
Truck	6,664***	0,0092
Honda	-2,856	0,106
GM	15,431***	7,17E-06
Ford	-1,612	0,6221
Nissan	13,639***	3,88E-09
Toyota	8,599***	5,30E-06
Hyundai	-4,891**	0,019
FCA	24,368***	1,36E-07
New	-7,011***	0,0019
Adjuster r-square	0,314	

**p<0.05, the coefficient is significant at a 5% level*
***p<0.01, the coefficient is significant at a 1% level*
****p<0.001, the coefficient is significant at a 0.1% level*

Table 1.2.: OLS Regression Results

What can be noted from *table 1.2* is that the adjusted R^2 (coefficient of determination) value is 0.314 which means that on average, 31.4% of the dependent variable is explained by the independent variables. With this noted one can perform inference on the results from the regression.

Mileage has a small but significant negative effect on markup. When mileage increases by one unit (1000 miles), the markup will decrease by 0.34% on average.

On the other hand, if the car is new seems to also have a statistically significant negative effect. If the car is new, the markup is expected to decrease by 7.01% on average.

There is a significant different effect the type of vehicle has on markup. SUVs seem to have a large negative effect on markup while Trucks have a large positive effect. If the vehicle is an SUV, the markup is expected to decrease by -6.54% on average whereas if the vehicle is a truck the markup is expected to increase by 6.66% on average.

There are also differences between the effect that different car manufacturers have on the markup. Where there are statistically significant results for the manufacturers GM, Nissan, Toyota, Hyundai, and FCA. Statistically insignificant results can be obtained from the manufacturers Ford and Honda which will be omitted from the analysis. If the car is from FCA, the markup is expected to increase with 24.36% on average. If the car is from GM, the markup is expected to increase with 15.43% on average. Cars produced by Nissan see an increase in markup by 13.64% on average. Toyota cars have an increase in markup by 8.60% on average. However, cars from Hyundai see a statistically significant decrease in markup by -4.89% on average.

A regression that includes MSRP as a variable can be found in the appendix. Figure 4 suggests that MSRP may have a negative effect on markup since dealerships want to

maximise their profit. But as MSRP increases, the profit margin decreases. This regression is not included because MSRP can be viewed as endogenous as markup is partly a function of this variable. But it is exogenous in some remarks since manufacturers set the MSRP while dealerships set their own prices.

6. Discussion

It is quite surprising to see that mileage has a small, yet negative effect on markup. The effect of mileage is expected to be larger on average than what is found here. This may provide support for the fact that new cars are harder to acquire due to excess demand and a shortage of supply discussed in section 2.4. Meaning that consumers may find it hard to purchase new cars due to decreased production and as a result demand for used cars increase and hence, the devaluation with miles is not as large as normally. Additionally, if the car is new, it has a negative effect on markup which is interesting. A claim that this may support is that the RPM agreements could be flawed. This is because the MSRP only applies to brand new cars with zero miles on the clock, and possibly an arbitrage opportunity arises in this for the dealerships. A dealership could sell the brand-new car for the MSRP to a colleague, a friend, or family member for a price at the MSRP. That person could then drive as little as 1 mile, sell the car back to the dealership that now does not have to apply the MSRP anymore and can list the price with a markup. Without facing consequences from manufacturers like Ford discussed in section 2.5. There is evidence to support the claim that dealerships make use of arbitrage opportunities when presented. One article mentions that a hurricane swept across Ohio in 2017 and destroyed approximately one million cars of inventory which presented dealerships with an arbitrage opportunity to raise the price on their inventory. Even if it was not the dealership affected (Jamie Butters, 2017).

What is also interesting is that SUVs had a negative effect on markup while Trucks had a positive effect. This may suggest that the type of car is an important factor for a positive markup and that the car types have largely differing demand curves. Furthermore, a

significant difference in effect between the car types where might suggest that there is a larger inventory of SUVs in relation to Trucks.

The manufacturers had a large positive effect on the markup. This does make sense due to what has been discussed in section 2.4. The manufacturers in the regression had larger demand compared to other manufacturers and may in relation to other manufacturers have been hit more severely by the supply shortage and production issues. This might cause extra markup on these certain brands compared to others. For example, FCA and GM which are large producers of pickup trucks saw a 10.8% decrease in year-to-date (YTD) sales between 2020 and 2021 of GM's bestselling model, the Silverado. Which might support that GM's production has been impacted severely. For FCA there was a marginal increase in YTD sales on several models. For example, the Jeep Grand Cherokee saw a 26% increase which may suggest that there is on excess demand on cars from this manufacturer group.

6.1. Vertical Pricing and Social Optimality

A vertical pricing structure raises the question if it allows for socially optimal allocation of resources. Social optimality within economics is characterised by pareto efficiency, named after economist and civil engineer Vilfredo Pareto. This describes a situation where you cannot make one individual better off without making another individual worse off and vice versa. Thus, a socially optimal situation. It is rare to see a pure pareto efficient solution in practice but, there are usually ways to make a pareto-improvement. Initially, a market with a vertical pricing structure is not in pareto-equilibrium due to it being characterised by imperfect competition (Springer., 2013). An example in this case of a pareto-improvement is the use of RPM agreements by the manufacturer to ensure that there is a sufficient level of service to the consumer because it makes all three parties better off as discussed in section 2.5.

However, there is also an issue of equity, or fairness as John Rawls would describe it. Even though a solution is pareto efficient, there can still be inequalities present. Rawls argues that injustices are only justified in society if they are advantageous to the worst-off members off society (Wenar, 2021). From this point of view, one might argue that there should not be any markups above the MSRP but rather a que system implemented. Although a system like this would potentially deny the individuals with the highest willingness to pay it would allow persons with a lower willingness to pay to have a greater chance of acquiring the same good. This can be argued to be a fairer approach.

What can be understood throughout the research is that for brand new cars there already seems to be a que system in place where a consumer orders a car and has to wait for production and delivery and will pay a lower markup compared to an individual that is not willing to wait and instead purchases a used car at a larger markup.

7. Concluding remarks

To conclude this thesis, it can be said that there is a retail price management agreement between car manufacturers and dealerships which most likely to benefits both the manufacturers, the dealerships and, the consumers. It aims to achieve optimal shared profit between the manufacturers and dealerships while still providing a service level to the consumers. It is also discussed that there is a disequilibrium in the car market at the moment. Due to excess demand as a result of more optimism post-covid and a supply shortage of cars due to microchip shortages and other supply chain issues. Henceforth, it may present an arbitrage opportunity for car dealerships to either increase their markup or deviate from the RPM agreement.

An OLS regression was used where percentage markup is used as the dependent variable. The results suggest that there is in fact an arbitrage opportunity since mileage affected

markup positively. The regression also supports the claim that manufacturers may have been affected seriously by the supply shortages since the manufacturer variables have a large positive effect on markup. Indicating an inventory deficit of those brands.

Lastly, the trade-off between pareto-efficiency and equity is discussed. It is concluded that RPM agreements at least provide a pareto-improvement in a market with imperfect competition. On the other hand, even if it is an almost pareto efficient solution, it may still be inequal. As John Rawls claims, inequalities are only justified if it is advantageous to the worst-off individuals. A possible system to make it fairer may be to have ques instead.

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9. Appendix

9.1. Variance Inflation Factor

Minimum possible value=	1
Values > 10 May indicate a collinearity problem	
Mileage	1,549
SUV	2,126
Truck	2,477
Honda	1,806
GM	2,123
Ford	1,848
Nissan	1,273
Toyota	1,999
Hyundai	1,265
FCA	1,830
New	2,010

Figure 1

9.2. Normality of Residuals

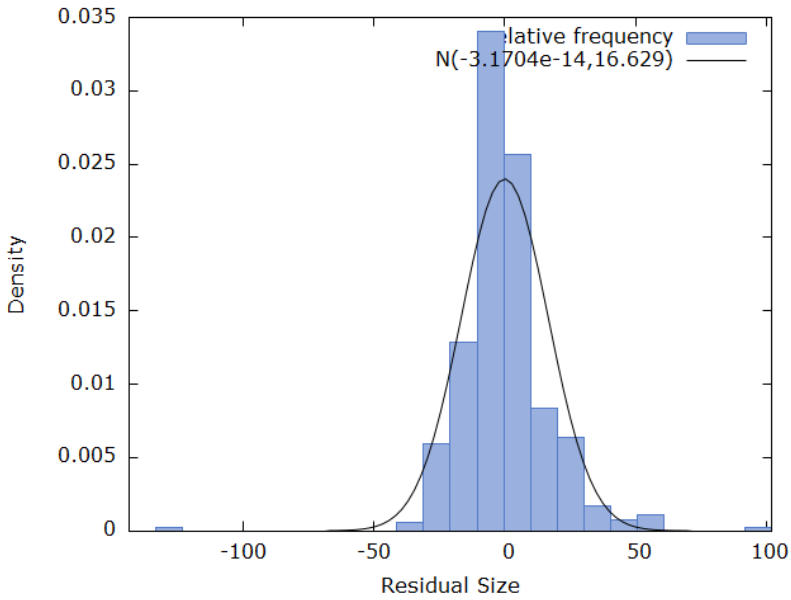

Figure 2

Author: Philip Svärd
Supervisor: Håkan Jerker Holm
Spring semester 2022
Lunds Universitet
Nationalekonomiska institutionen

9.3. Breusch-Pagan Test

Test statistic: LM = 220.851351
with p-value = P(Chi-square(11) > 220.851351) = 0.000000

Figure 3

9.4. Regression with MSRP as a factor

Variables	Coeff	P-value
Const	53,639***	7,170E-42
MSRP	-0,455***	7,880E-10
Mileage	-0,414***	2,350E-05
SUV	-5,743***	6,910E-05
Truck	13,977***	2,210E-07
Honda	-6,244***	0,002
GM	13,907***	7,310E-05
Ford	2,023	0,498
Nissan	9,534***	3,000E-04
Toyota	5,357**	0,015
Hyundai	-5,458**	0,017
FCA	26,677***	6,770E-09
New	8,395***	2,000E-04
Adjuster r-square	0,356	

Figure 4