Università degli Studi di Messina

Dottorato di Ricerca in Scienze Economiche, Aziendali e Metodi Quantitativi

(XXVIII ciclo)

Coordinatore: Chiar.mo Prof. Dott. Edoardo Otranto

Tesi di Dottorato:

Oligopsonistic Cartels Recognition:

A Parse of Outliers and Wavy Variations in Intermediate Prices Transmission.

SSD.: SECS - P / 01 Economia Politica

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Quadriennio Academico 2013 – 2016

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Acknowledgements:

"People of the same trade seldom meet together,
even if for merriment and diversion, but the
conversation ends in a conspiracy against the
public, or in some contrivance to raise prices."

Adam Smith, Scottish Economist,
"An Inquiry into the Nature and
Causes of the Wealth of Nations"
London, England, 1776

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Summary:

Abstract:

When the number of intermediates in a market is reduced, they become price-makers which allow them to handle production policies through demand control. Seen that one of the most important State missions is insuring market equilibrium, several national legislations throughout the world and international treats establish artificial oligopsonistic as a criminal offence against free competition. Notwithstanding the legal treatment, empirical studies show that oligopsonistic cartels seem to be unsighted by Concurrence Authorities although their noxiousness, the same happens in academy. The hindrance, as aforementioned, is not the lack of legislation but the intricacy to detect counterfeit oligopsonistic cartel in a very accurate manner as legal trials require. Thereunto this research proposes, using estimate and dynamic models, to demonstrate that a specific market is subjected to oligopsonistic control. We reviewed and extended a theoretical method of identification models that are used in specialized literature, expounding versions of both, static and dynamic price elasticity so that we can illustrate the wavy trend in price outliers highlighting how it is rather more precise to identify such market failure than other methods. We dispelled the antithetical possibilities of Giffen Effect over prices, considering extensions to models with Walras' mixed-strategy equilibrium, substitution effect and the Pareto optimum price which provided us homogeneous insights that can be used in oligopsonistic settings to conduct inference about the outcomes. We found, considering hypothesis of linear errors with less theoretical restrictions, that the cyclic wave in intermediate prices is not fortuitous but a robust denotation of oligopsonistic cartel activity and can support Market Authorities in legal trials.

Key Words: Oligopsonistic Markets, Economics, Law, Political Economy, Quantitative Methods, Antitrust Polices, Price Variations, Entry Barriers, Cartels, Outliers.

JEL Classifications: K21, D43, L11, L13, C41

Abbreviations and Acronyms[1]:

ACF: Autocorrelation Function

AR: Average Revenue

ASR: American Sugar Refining Co.

ATC: Average Total Costs

BC: Budge Constraint

CADE: *Conselho Administrativo de Defesa Econômica*

EC: European Commission

ECB: European Central Bank

ECOWAS:Economic Community of West African States

ECT: Error Correction Term

ED: Entry Decisions

EEA: European Economic Area

Eq: Equation

FDC: *Fundação Dom Cabral*

HU: Harvard University

i.i.d.: Independent and Identically Distribute

IO: Industrial Organization

IRJS: *Institute de Recherche Juridique de la Sorbonne*

JEL: Journal of Economic Literature

LF: Likelihood Function

LSE: London School of Economics

MA: Market Authorities

MC: Marginal Cost

Mercosur: *Mercado Común del Cone Sur*

MG: *Minas Gerais*

MR: Marginal Revenue

MRS: Marginal Rate of Substitution

NAFTA: North American Free Trade Agreement

NEIO: New Empirical Industrial Organization

NYC: New York City

OC: Offer Curve

OLS: Ordinary Least Squares

OLSR: Ordinary Least Squares Regression

OPEC: Organization of the Petroleum Exporting Countries

PED: Price Elasticity of Demand

PPI: Producer Price Index

PUC: *Pontifícia Universidade Católica;*

OPOP: Oligopsonistic Pareto-Optimal Price

SC: Supreme Court

SEC: Securities and Exchange Commission

SEE: Standard Error of Estimate

SEM: Simultaneous Equations Method

SEM: Structural Equation Modeling[2]

SOT: Standard Oil Trust

TECM: Threshold Error Corrector Model

UBA: *Universidad de Buenos Aires;*

UDB: *Universidad Deusto de Bilbao*

UFJF: *Universidade Federal de Juiz de Fora*

UFMG: *Universidade Federal de Minas Gerais*

UFRJ: *Universidade Federal do Rio de Janeiro*

UK: United Kingdom

Unime: *Università degli Studi di Messina*

USA : United States of America

U.S.S.R: *Union of Soviet Socialist Republics*

VAR: Vector Autoregressive

VECM: Vector Error Correction Model

WIC: Women, Infants and Children

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[1] In alphabetical order of the abbreviation or acronym.

[2] They are used in totally different context, therefore, there is no chance of misinterpretation.

Preface:

This thesis is unpublished and brand new not only in edition but also because of the topic chosen. The basis of which this survey on oligopsonistic markets was conducted is original and independent among several others on related content. It has been written to fulfil the PhD requirements of the Program at the School of Economics of the Messina University as part of the XXVIII cycle of the Doctorate program but also for personal desire to contribute for Economic science on this thorny issue.

My research hypothesis was formulated together with my supervisor, Prof. Bruno Sergio Sergi, from Harvard University. The research was laborious especially because of the originality of the topic developed, but it was conducted in an extensively investigation which allowed me to answer the previous questioning that we have identified. There was a visiting research period at *Université Paris 1 Panthéon - Sorbonne* (France). All methods and tools were previously discussed and approved by the director of this research. I counted with the support of many researchers during this academic period but I was the lead investigator, responsible for all major areas of concept formation, data collection and analysis, as well as manuscript composition.

English supervision was handled by Prof. Schade.

A version of Chapter III has been published in the journal of *"Institute de Recherche Juridique de la Sorbonne"*. Prof. Behar-Touchais, from *Université Paris 1 Panthéon-Sorbonne,* who induced me early initiation in oligopsonistic cartel conditioned postural behaviour, but I am the responsible for the conclusions explained in Chapters V and Conclusions.

I would like to thank my supervisors in USA as well as in France for their excellent guidance and support during this process. I also wish to thank all of the respondents, without their cooperation I would not have been able to conduct this analysis. Many thanks for the Economist and Professor at *Fundação Dom Cabral* Gustavo Costa for the cooperation and helpful ideas about my research. I also have to recognise PUC Minas for the all support it gave to me. My co-director Sueli Moro, from UFMG, deserves the final note of thanks, especially for the wise counsels and endearments which were a lighthouse to the Econometric Model.

I hope you enjoy reading this thesis!

Methodology:

This is a theoretical research which intends to identify an oligopsonistic market using mainly 5 methods: estimation of demand elasticity; transactions and offer equations; structure of production preferences; reduced-form methods; and the use of econometric analysis.

Several models of entry decisions (ED) describe market interaction only from the entrepreneurs' point of view. However, during the last years more and more ED models start to analyse them from two different angles: the entrepreneurs who are willing to move into the market as well as the agents who are already there. The first one could be classified as a typical binary choice (enter or not - even though the results can be tailored to acknowledge discrete outcomes), but when it comes to interaction with the second one, models become much more complex with multiple choice makers and strategic interaction among agents.

A typical reduced-form model may explain the variation in the price of a service or a product as a function of a series of variables relating to demand, cost interests and market structure. Econometric tools, however, include additional information to describe some subtle oscillations which would interest for legal reasons, such as the price of a product paid by customers in different regions or in a set of variables that affect per-unit costs.

Moreover, in order to prove the existence of a non-natural oligopsonistic structure of market, it is necessary to consider not only profit variations, like price and costs, but also the economic model of entry which is mostly based on decisions from entrepreneurs, both insiders and outsiders, and a profit function containing variable and fixed profits. With that piece of information, we can compare choice probabilities predicted by the model with strange outcomes where the gap between the potential decision of entry and the real one is large enough to conclude that there is undercover pressure on the outsider's decisions.

Seen that, the identification question clarifies what can or cannot be learned about the parameters of the profits functions under a set of maintained assumptions. We try to get the closest possible to reality, in order to keep the theoretical restrictions under severe control, of course some are more plausible than others, but always through the lens of legal case's needs.

The gap aforementioned is done by comparing the predicted choice probabilities, under the maintained assumptions, to the observed ones. Naturally, using fewer assumptions, like functional forms or stochastic restrictions, helps to ensure credibility and robustness of the results.

Assuming it, we emphasis that this research is interdisciplinary: it is made on econometric bases for legal purpose, thus we will use theoretical approaches of cause-consequence of economic behaviour but being very careful to use the fewest assumptions possible, which will put the necessary strain on identification of non-natural oligopsonistic markets.

If, on the other hand, this econometric model becomes ineffectual in that identification, it will not be helpful in distinguishing between different statuses of oligopsonies, which is crucial for legal use. Therefore, the research needs to delicately balance the tension between model assumption and real identification.

Researchers usually adopt one out of two opposite types of approaches:

The first one is the bottom up approach where the research starts with the weakest assumption possible and gradually moves "up" by adding restrictions which can be relevant in that inquiry. At every phase, the researcher examines the prediction of the model or set of models and sees how these change the results with the addition of further assumptions. This approach usually relies on starting with the necessary conditions that an economic model implies and observes whether there are any restrictions that these conditions impose.

The second one is the other way round, a top down approach, where it starts with a given econometric model and then attempts to analyse its strength through the various assumptions made. It is a heuristic technicality which studies the sensitivity of the results to strip them off, and, after studying them, separate the relevant from the non-relevant parametric assumptions.

Both approaches have pros and cons. In the first one, the research has a more open view on the market and the entry barriers; however, it becomes less precise in a specific case. The second one is more precise with a reductive view of the market. That is the trade-off that we must assume.

In other words, to choose one out of those two lines, researchers need to clearly define the goal of interest. Due to the interdisciplinarity of this research, fully based on econometrics models and Microeconomic theory, but with legal purposes, we cannot forget the need of preciseness in distinguishing the two types of oligopsonies which would define whether it is a criminal act or not. Consequently, our approach will be the second one.

Outline:

This research starts with a brief historic approach about oligopsonistic collusions and its practices in economic history, followed by and introduction of antitrust policies around the world and its obstacles to identify, investigate, prosecute, prove and sanction cartels. Afterwards, there is a discussion about price elasticity as a form of entry models, its utility for legal purposes and an analysis of equilibrium market structure where firms make a Manichean decision to be in or out of any specific market.

The next step is an analysis of substitution effects in oligopsonistic markets, screening the reasons why suppliers do not change middlemen when they are expected to do so. This irrational suppliers' inertia is a potent tool to illustrate the distortion, and consequently, the existence of a market failure. Next, we review existing identification results for threshold crossing models in the context of a simple oligopsonistic entry model inasmuch as they have important similarities as well as differences which could lead the research to more precise results.

The following step is the analysis of the results so that we can identify and indicate the parameters of interest and the type of Oligopsony, which depends critically on the underlying assumptions.

The next rung is to explore scenarios of firm heterogeneity. This will expose the econometric model to a more complex situation with a variate discrete choice ambience, strategic interaction, multiple equilibria and mixed strategies, showing the identification of a non-natural oligopsonistic market in a more realistic setting.

So, it would lead us to consider inference in models that do not identify the parameter of interest, allowing us to discuss models for even more realistic settings, whereas incomplete information is the rule and not the exception and we also highlight the inferential problem and the role which different assumptions play in the final results.

Finally, we consider simple dynamic models based on outliers' price elasticity with i.i.d. errors and price cycles. We also highlight oligopsonistic optimal-Pareto prices and possible outliers as well as Walras market equilibrium applied to oligopsonistic cartels and deflationary trend to prevent any antithetical misleads in prices analysis. We review the existing identification results to show the liability of the model to confirm the existence of non-natural oligopsonistic cartels by prices outliers and then suggest a few alternative approaches that provide identification under different assumptions and the loss of certainty which everyone can subscribe to the model.

Literature Review:

Since this thesis is interdisciplinary among quantitative methods, microeconomics and Law & Economics, we quote here the most important authors only, those who helped to develop the hypothesis and support the final thesis. Their theories are presented and justified in order of clustered subjects:

In microeconomics and IO, the French Nobel prize in Economics Jean Tirole is one of the most influential researchers for this thesis. We emphasize: "A Theory of Incentives in Procurement and Regulation"(1993), "Dynamic Models of Oligopoly"(1998), "Payment Card Regulation and the Use of Economic Analysis in Antitrust"(2011), and also, "Overcoming Adverse Selection: How Public Intervention Can Restore Market Functioning"(2012),

Making a parallel with his studies in IO, Cartels, Econometrics Analyses of non-competitive markets and regulation, we were able to synthesize the theory of the price's cyclothymia in oligopsonistic markets proposed in chapter III. According to Tirole, corporations generally tend to take short-term risks and he recommended a change from quantitative into a more quality-based market stimulation policy, otherwise, big companies eliminate risk of their activities, since failure is no longer their problem, but a social and governmental issue.

In econometrics, Dalen *et* Thurik's paper: "A model of pricing behaviour: An econometric case study" (1998) was influential in our work. Their price testing shows that markets naturally walk towards oligopolistic structures because the incentive to undercut prices is far less interesting to firms than a trust among them. When, for many reasons, cartel is not possible, price competition ensues for a comparatively short period until one competitor relents. The time necessary for replacement of the competitors is always longer than the period of price competition and it hardly comes naturally, but with state intervention. In other words: the undercutting phase of falling prices lasts significantly shorter than the one of restoration.

Still in Econometrics, J. Jacobs, in "Econometric Business Cycle Research: an assessment of method" (1998), revealed that the more asymmetric the cycles the worse for consumers, who tend to believe that price cycles are evidences of free market situation. His conclusions make clear that stable high prices policy is not the best option for middlemen. It is based on the false common knowledge that entrepreneurs would have higher profits if they could maintain a stable higher price, suggesting that the lack of price rigidity in cycling prices is a signal of real and productive competition.

William Greene(2012) was another remarkable author analysed for this thesis. His studies in Regression Models, specially the applications in non-linear consumption function (ch. 9.3 - 2003) and his analysis in systems of regressions equations for demand (ch. 14.3 - 2003). According to his model, a natural set of prices can be obtained because a simple linear model is a special case, so, in order to avoid to make a special case became a standard one, he advises that the procedures must be used at the last iteration[3] to obtain the asymptotic standard errors and an estimate (or make this comparable to) in the linear model, the value includes the degrees of freedom correction. We were also interested in his theory about the marginal propensity to consume. In his expanded model, the marginal propensity to consume is constant, that would tell us a lot about why final prices rise when intermediate prices decrease. A joint test of both in this model, the marginal propensity to consume allows us to estimate its standard error using the delta method as he advice.

Complementary information was added analysing "Structural Equations, Treatment and Econometric Policy Evaluation"(2005) by J. Heckman *et* E. Vytlacil. Their review showed that the rigidity of prices, historically associated with better policies, ends up improving the market inefficiencies and entry barriers. In another paper, published in Econometrica: "Dummy Endogenous Variables in a Simultaneous Equation System"(1978), Heckman ascertained that cycles would yield higher average profits than a more stable price. Although he firmly sustains that state interference fixing prices would be even worse than price cycles.

Bergström *et* Vedrin simplified the effort of interpretation with their article "Measuring and Interpreting Business Cycles" (1994). They suggested that interferences aiming to produce less abrupt cycles (or to soften the cycles) are welcome, and, of course, through logical economic stimulus, otherwise consequences can be worse than not interfering at all. Their conclusions on demand behaviour are essential to isolate outliers in outcomes whether a rise in price level is a clue of oligopsonistic market actions, or, instead, it is a consequence of other market phenomenon.

According to Bergström *et* Vedrin's theory, in a few markets with special characteristics, a rise in price, instead of leading to a demand fall, it can induce an augmentation. It occurs when the new cost level provokes a large drain on the consumer's budget, making families raise the marginal utility of their wealth for that good, thus they are forced to restrain their consumption of complementary goods raising their consumption of the refer good.

E. Slutsky provided a deep and first-rate research in econometrics and microeconomics: "*Sulla teoria del bilancio del consumatore*" (1915)[note i.1]. One of the major troubles for researchers in oligopsonistic markets, is the lack of a stable theoretical frame that could allow the separation

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[3] He uses 8 iterations.

between the substitution effect and the income effect in the final demand changes. Slutsky's equation provided an excellent tool to separate these two effects and to precise how much of this new amount is due to the first effect and how much is due to the second one. His achievements, using derivatives, integrals and cross-price effect on the original good quantity, were a strong device to arrive an evidence of the existence of an oligopsonistic arrangement.

Koop, Pesaran *et* Potter (1996), gave us a strong tool to prove that entry prices policies have a gap to reflect in final prices under some conditions. These upward-sloping demand curves can mislead researches in oligopsonistic settings; however, based on their revised theory, we saved a lot of time and effort verifying income effect transmissions and final price increment. Effectively, their contribution is the new deal with the income effect describing how the quantity demanded of good responds to these effective income changes (and how it doesn't). It allows us to split up the outcomes and to better analyse the effects, which are effectively from income changes.

Robert Giffen published a significant number of relevant essays in statistic, microeconomics and economic behaviour; Among his principal publications we can highlight: The Growth of Capital (1890), The Case against Bimetallism (1892), and Economic Inquiries and Studies (1904). His conclusions about demand behaviour are essential to isolate outliers in outcomes whether a rise in price level is a clue of oligopsonistic market actions, or, instead, it is a consequence of other market phenomenon such as Giffen Goods.

Under these circumstances aforementioned, suppliers can manipulate price policy lifting up profits with social losses. Under these conditions graphics have upward-sloping demand curves, which can mislead researches in oligopsonistic markets. Giffen also revised demand curves under several substitution effect and the income effect transformations. The substitution effect states that consumers demand more of a good when it goes down in price and vice versa. The income effect, however, is more complex, and the Giffen contribution is special noteworthy for this research since not all goods respond the same way to changes in income and a shallow analysis could mislead revision conclusions.

Harrington (2006) explained the incentives for the Cartel, and he researched on income effect describing how the quantity demanded of a good responds to these effective income changes and how it is not. It allows the research to split up the outcomes, to analyse the effects better, which are effectively from income changes. He analysed 20 European Commission decisions over 2000–2004, and he describes the outcomes in terms of the setting of price and a market allocation, monitoring of agreements with respect to price, sales, methods for responding to external disruptions from non-cartel suppliers and handling over-zealous sales representatives and organizational structure.

A classical about cartels researches is Koutsoyiannis (1977), according to him, if a good is a normal good, then the income effect states that the quantity demanded of the good will increase when the price of the good decreases, and vice versa. If a good is an inferior good, then the income effect states that the quantity demanded of the good will decrease when the price of the good decreases, and vice versa. Those statements are deeply analysed in the 3rd chapter and guided the researcher to chief conclusions on this work.

In Law & Economics, Posner (2010) helped to stablish the Law principles of intervention for oligopsonistic cartels' problem. His contribution is the new deal from the common law perspective to face public regulation of the market and business organizations. On his book, the author gives very important insights, including analysis of law to prevent market failures, the re-emerging field of organization economics and judicial behaviour. Tigar (2006) was the most sensible reference for the 1st chapter; his studies based on law, cases, jurisprudence and wide fringe of primary sources demonstrates the legal theory of insurgent European bourgeoisie showing why cartels have, historically, not received adequate legal treatment and which approach would be the best one to face the question of oligopsonistic cartels.

Ghosal published several articles, papers and books about Law & Economics and Competition, particularly about Cartels problem. We highlight: "The Law and Economics of Enhancing Cartel Enforcement: Using Information From Non-Cartel Investigations to Prosecute Cartels" (2011); "Regime Shift in Antitrust" (2007) and {*et* Sokol} "Policy Innovations, Political Preferences, and Cartel Prosecutions" (2015). His proposals to enhance cartels enforcement were significant. His findings from the estimation provided strong evidence that a number of non-cartel investigations and external signs of price manipulation lead to an increase in cartel cases and prosecutions.

He indicates that non-cartel investigations (merger or monopolization) may reveal information about cooperative pricing and market allocation schemes and provide valuable information for cartel cases, and he exemplifies with several cases, such as Archer-Daniels Midlands; Hoffman-La Roche and Rhone-Poulenc; Bid-rigging in the construction industry. He quotes a 1999 case about a settlement reached in a milk price-fixing case where Marigold Foods, Land O' Lakes, Geo Benz and Sons, and Marigold Venture along with Dairies Trade Association were the accused. His analysis of those cases contributed significantly for the development of our final thesis.

In a multidisciplinary paper between Econometrics and Law & Economics, Caves *et* Singer (2014) provided important tool in the same line where we researched for this thesis. According to those authors, reduced form models can be employed in antitrust litigation, as long as a panel of data includes transactions database, because they are crucial to understand repeated cycles

in princes without exogenous reasons.

Following their reasoning, multiple purchases and sales in synchronicity by potential members over time drive the logarithm of final price paid by consumer to an expected outcomes. In a reduced form framework, the purpose of including cost and demand variables is to control erros that may occur due exogenous factors. They justify it stating that: "if the alleged conspiracy took place at a time when de defendant's input costs were rising, it will be necessary to control for this because any observed increase in prices may be wholly explained by rising costs. Conversely, if the defendants' costs were falling substantially during the alleged conspiracy, failure to include input costs as a control variable may cause the expert significantly underestimate the inflationary effect of the conduct". Their conclusions were fundamental and helped to develop our theory in ch. IV, V and exclude antithetical results on ch. VI.

Introduction:

Why researching in models of price variations to detect oligopsonistic cartels? In the empirical study of markets, entry barrier models are often used to study firms' profits and the nature of competition between them. The general idea of these models is that firms enter a specific market, whether moving from another one or initiating from the beginning, only when they expect to operate above a minimum profit line (marginal cost > 0), and therefore entry decisions can be used as an indicator of a latent profit function.

The study of free entry, entry barriers and free mobility in competitive markets are a bit subtler, because none of the agents act in cahoots with another. Notwithstanding, when it comes to oligopsonistic markets it turns unclearer, especially because of the strategic interactions between firms which are, obviously, undercover making it difficult to bring into light in legal prosecutions: "no proves = not guilty"

This means that traditional ideas in the econometric literature on discrete choice models are good for identifying oligopsonistic cartels. However, most of them deals only on the existence - or not - of an oligopsonistic market, but not if it is handmade or natural, what is crucial for juridical and administrative trials.

Moreover, although oligopolistic and oligopsonistic cartels have the same goal, which is that in the equilibrium market between consumers and providers, making the balance tends towards their side, the strategy is diametrically opposite. In oligopolies, the fewer the numbers of agents gathered, the better they can control the prices, whereas in oligopsony, the bigger the number of intermediates gathered, the better they control the prices. Therefore, using the same economic literature for both phenomena can sometimes result in inaccurate outcomes. Therefore, entry barriers models are useful identifying oligopolies, but they are not that useful to identify oligopsonistic structures of markets.

In addition, most of theoretical schemes about oligopsonistic markets are made by economists for economic purposes, but not for legal issues. Thus, for the goals aforementioned, the current theorems can be somehow improved to account for those strategic interactions which could draw a line between the natural and non-natural oligopsonistic markets.

What are the possible identifications using price variation analysis?

The identification that is expected from this work would be an econometric support for oligopsonistic antitrust cases. Particularly for non-economists, it is quite difficult to see how

evidences derived from quantitative methods alone could provide conclusive indication about conspiracies; as (frequently) the judges in antitrust trials have a major knowledge based in Law & Economics, but, in econometrics, there is a clear shortage, considering that this is a very specific field of economics science.

On this research, we will unfold these methods to show that such evidence could support a view that alleged conspiratorial behaviour was - or was not - consistent with the unilateral self-interest of intermediate firms alleged to have conspired.

We also have to add that to class certification, this research does not address questions related to the admissibility of expert testimony as well as geographic or time differences in prices, which account for omitted variables , the so called "fixed effets" in the model. The model is called "reduced form", because the price equation is derived from other more basic economic relationships relating to demand and supply. As a result, the parameters, the variable coefficients in a multiple regression model, of a reduced-form equation are typically functions of a structural parameters number, the parameters of the underlying economic relationships.

The most common econometric method employed in antitrust litigation, in order to prove the existence of an oligopsony, involves the estimation of "reduced-form" price equations. Because of their complexity, the entry barrier models are less used in real cases. However, there are several important economic questions that can be answered by considering models of oligopoly entry threshold, such as the nature of competition among firms, the Pareto Optimum number of firms in a specific economic sector, the Walras Equilibrium market structure under alternative hypothetical scenarios and the source levels of firm profitability among others.

It is true that these questions can sometimes be answered easily from the data, but the "nature of competition" question is subtler and needs more tools to be sufficiently proved. In the last decades, researchers were sponsored by entrepreneurs interested in questions as: "*how fast profits decline when number of firms increase*" or "*how long is this market still profitable*" among others, which clearly answer their investments queries. Unfortunately, sometime, even researches are under market interests.

Moreover, the conclusion on the oligopsonistic origins can also be reasonably complicated. Predictions within the range of the observable data can often be easier made without inferring any structural parameters. Notwithstanding, to define it for legal sanctions purposes, predictions about the conducts and conscious intentions of any single player shall be very precise due to criminal principles as "precision", "taxactivity" or "adjustment" which are applicable in most democratic societies throughout the world.

According to these principles, the conduct of an agent who plays a role in the

architecture of a criminal oligopsonistic cartel must be identical to what is required by law in order to be considered a criminal offence.

This suitability between agent's action and what is predicted by legal implies a greater effort and deep research in order to subsidize the decision-making of judges involved in oligopsonium case judgements. This research intends to provide a contribution in this sense.

Another parameter is used to indicate the existence of an oligopsonistic market: the number of potential entrants who do not effectively get into a specific market as a result of entry barriers, because of a regulatory structure or other singular condition. However, this is a parallel analysis. The focus here will be to analyse non-coherent prices variations as well as to measure the gap between expected and real prices. These predictions, to be accurate enough, often require a research which will unveil structural ground.

Regrettably, but logical enough, firms do not offer accurate information about their oligopsonistic acts. It would be naïve to expect them to confess a crime. So, we use theoretical methods to analyse the visible consequences of their deeds in the markets.

Reduced-form relationships are frequently easier to estimate than structural relationships from which they are derived. It can be difficult to identify demand, for example, both conceptually, due to an inability to distinguish the demand from supply forces, and empirically, due to a lack of data. There are many occasions in which reduced-form estimates can help to answer relevant questions. However, there are risks associated with the use of reduced-form models. While the parameters of structural equations are linked to the underlying economics, this is not always the case for reduced-form parameters. Thus, one runs the risk of generating misleading results when the nature of competition changes over time. Aware of it, this research decomposes antithetical variables as the hypothesis of the Giffen effect in action and in unexpected price variations among other possibilities. Only after that we offer our conclusions which, as we hope, can contribute for a clearer, securer and fairer process against oligopsonistic cartels.

Chapter I – Prolegomenon and Historical Evolution:

1.1 – Etymology and Definitions:

Many historical reasons justify the study of the terminology of words such as cartel, trust, oligopoly and oligopsony. For the thesis, specifically, clarifying and make unambiguous economic and juristic concepts, that we are going to work with, is an imperative.

The English word cartel comes from ancient Latin "*Cartellus*", whose derive in Italian is "*Cartello", "Cartell"* in Catalan and in the others neo-Latin languages, such as French, Portuguese, Galician and Spanish, as in English "*Cartel*". It is also quite close to the terminology in other Indo-European languages, such as the Saxon and Scandinavian language families, like Swedish, Norwegian or German, which use the same word: "*Kartell"* or "*Kartelli"* in Finish. Even in languages which do not use the Latin alphabet, the pronunciation is pretty close to its origin, such as Chinese: "卡特" ;   Russian: " *картель* " ;   Greek: " *καρτέλ* ", Arabic: " المنظمة "; Japanese:

" カルテル ", or Traditional Chinese: " 企業連合 ";

The vocable was first used in a letter of agreement signed between belligerents for the exchange of war prisoners. Then the evolution of the concept led to the meaning of cartel as an agreement among sellers or services providers in order to regulate supply in an attempt to manipulate prices, a gathering of businesses or even countries that act together and agree to influence prices for certain goods and services by controlling production and marketing.

For those concepts aforementioned, it is easy to see that cartel is more frequently analysed from a perspective of producers or services providers, than from the middlemen side, which would be an oligopsony, as or even more shatter for market than the other outline. The lack of conscientiousness of the problem, which is a problem itself, will be better explained in the chapters ahead.

In many situations trust and cartel are considered the same approach to achieve price control, and in general it is a group of companies who illegally collude to fix prices and eliminate competition. Several laws, made throughout the world to prevent these crimes, treat and punish them equally without major distinctions.

However, for technical purposes, both acts are distinguishable and have subtle but significant differences which made them a singular economic phenomena that must be analysed separately.

Trust is a particular variety of cartel[note1.1.1] which aims to prevent competition among the players who create a board of trustees where all the former competitors work for it.

There are several differences which start in their formation, much more complex in a trust because it relies on a bigger formality than a cartel. A trust, technically, is run by a board of trustees whereas an informal oral agreement could be enough to set up a cartel which does not require any specific organizational structure.

In a trust, members are not free in their internal policies of production, the control is exogenous, stable, dependent and centralized, while cartel is focused in prices not in production, controls are decentralized, unstable and members negotiate separately keeping their identity.

Another important difference is that cartels do not depend on members' capital, it is just an agreement among them and the partners have a horizontal type of relationship, whilst in a trust some money transference is needed and there is a vertical liaison between the trust and the trustees. In a cartel it is said to be associated meanwhile in trusts they can be considered affiliated.

The word cartel in economics has always been a definition of something illegitimate, whereas trust gained its connotations of illegality after the US anti-trust laws targeted trusts and defined them as "*a conspiracy in restraint of trade.*"

The word oligopoly comes from the junction of two ancient Greek terms: "*Oligos + Poliens",* original in Greek: "*pōlein*" which means: to sell. The word "oligos" means little, few or small, which could be translate to something like "few sellers". According to Chelala (2008) the word was first used by Thomas More.

> *"Sin embargo, menos popular es el hecho de que el primer uso del término se encuentra en una obra escrita en latín, Utopía, el celebre texto de Tomás Moro[4], pensador y político inglés."* [5]

The signification is slightly distinct from those mentioned above. It means that there are a small number of sellers, organizations, corporations, companies or service providers dominating the market or industry. Notwithstanding, it does not necessarily mean that they are colluding unlawfully or co-operating illegally in any sense.

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[4] Tomás Moro is Spanish translation for Thomas More. It is usual in Spanish language translating names when possible.

[5] CHELALA, S. M.: *Inflexibilidad Descendente de los Precios con respecto al tipo de cambio.* UBA. Buenos Aires, Argentina. (2008)

Oligopsony has the same origin, Greek, but the term which comes together with "*oligos*" is "*opsony*", or "*opsōnia*" in ancient Greek, which means to buy, or more specific, to purchase food.

There are another four words which must be mentioned here, because they will be frequently used in this thesis: duopoly, duopsony, monopoly and monopsony. Whereas "*oligos*" means few, "*duo*" means two and "*mono*" one.

Although these six words are quite similar and they have the same origin, there are differences in market situations which have influences on the conclusions. Thus it is important to differentiate them.

The origin of the term oligopoly is cloudy, but it seems that the fountain-head came in 1518, in the Latin version of Thomas More's book: "*Utopia*".

Some authors disagree, saying that the origin is more ancient, and the term was already used by quondam philosophers and scholars. Others, in alternative, affirm that the term is more recent, it started being used in the late XIX century.

Despite the shortage of sources, most of the authors states that the terminology "oligopoly" precedes the term "oligopsony", because the associations among consumers depend on a more complex social and commercial structure. For a long time, it was seen as a type of social organization, not as a market failure, thus it was a minor phenomenon with no relevance at all. So, there were no reasons to classify and study it as an economic fact.

As the standard definition, per the Cambridge Dictionary, an oligopoly is:

"*a situation in which a small number of organizations or companies has control of an area of business, so that others have no share A state of the market in which only a small number of buyers exists for a product.*"[6]

Chamberlin (1957) wrote that, although oligopoly and oligopsonistic practices were quite old in economic history, the terms are new. The main reason was that this phenomenon was so linked to commerce practices that it took a long time until societies realized the serious problem they were for markets' development, governments and societies due to the losses of efficiency, jobs, taxes, concurrence, innovation, among other things which arise from this market failure.

Edward Chamberlin states that:

"*It is true that the word came into general usage so quickly with the increased development in the early thirties of interest in the subject, that is was naturally applied at once to earlier writers. The result was that references such as to "Cournot's theory of oligopoly," etc., became frequent, and it was easy for the general economist to suppose*"

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[6] *Cambridge International Dictionary of English.* Cambridge University Press, 4°. ed. Cambridge, UK. (2013)

that the world had been in common use for a long time. But many of those with a special interest in economic theory of in the monopoly problem, who therefore are aware that it is of recent origin, seem to have only the vaguest notions, if any, as to where it came from. The matter is of some interest, not only for word itself but also for its subject matter as a segment of economics. It may therefore be in order to set down a few facts and even to include a reminiscence or two." [7]

Thus, to handsel the legal prevention of this market failure, there was a previous step which was the social and governmental awareness that oligopolization of markets is a problem to be solved for the benefit of all.

1.2 – A Brief History of Cartels:

Despite the shortage of sources, it is clear that commerce is spread out throughout the world since the rise of the *homo sapiens* and it was in fact towering in society's evolution. Oligopolistic and oligopsonistic practices are also old, much older than industrial revolution, which means they existed much earlier than the Capitalist System, and they arose just after commerce practices and remain in economic history up the modern times.

By all means, trade was not only important in our human society but it also shaped our world and our behaviour. There is no doubt about its importance in our history and that the way countries deal with commerce practices has a strong relationship with the standard of living.

Nevertheless, the evolution of commerce as a social phenomenon made some producers become traders. It is also true that traders became a class who have their own interests which very often do not coincide with those of societies. Additionally, it is a matter of fact that the more important the goods or services are for society, the more powerful is who controls its supply.

Aware of that fact, they eventually created its own class, which required special treatment and privileges. History has taught humankind that business cannot persist without rules and that the degree of improvement of the standards of economic law directly affects the development of the country. Therewith and moving so much wealth and so many people in that activity, conflicts of interest are not only common but also usual in trade practices. So, since the

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[7] CHAMBERLIN, Edward H.: *The Economic Journal,* Vol. 67, No. 266, pp. 211-218. England. (1957)

beginning of the humanity, men and societies realized the need for a special law and a set of rules for trade and their agents.

Just to show the coherence between my two theses, I quote myself from the law thesis written in 2006, also researching on the need for commerce regulation. Although from the legal point of view, the conclusion is the same:

> "*El comercio y los comerciantes tienen intereses propios que a menudo, no coinciden con los de la sociedad. Por esto, acabaron por crear una clase propia, que requería tratamiento especial y muchas veces, privilegios. La historia nos enseñó que la actividad comercial no puede persistir sin reglas y que el grado de perfeccionamiento de las normas de Derecho Económico influye directamente en el desarrollo del país. También es verdad que, por mover tanta riqueza y abarcar a tanta gente en su actividad, los conflictos de intereses son frecuentes, hasta se puede decir, habitual. Así que desde los comienzos de la humanidad, el hombre y la sociedad se dieron cuenta de la necesidad de crear un Derecho especial y poner reglas para el comercio y sus agentes*"[8].

That conclusion is by no means an attack to free market. On the contrary, it is an attempt to ensure it. History has proven that most markets, without any kind of regulations, end up in oligopolistic or oligopsonistic situations, generating great social losses.

Most of the authors state that oligopoly proceeds oligopsony practices, exactly because the associations among consumers depend on more complex social and commercial structure and a perception of advantages are subtly further unclear. They also have an upwards dependency of currencies compared to oligopoly. Moreover, oligopsonistic buyers depend much more on the existence of a stable currency than oligopolistic sellers.

There are several debates going on about whether states should interfere in oligopolistic or oligopsonistic situations. We will give a brief glance on the next chapter, remarking that those artifices were not always seen as bad practices by society. Instead, during the Roman Empire it was seen as a natural market practice which should be protected by law or even stimulated as a sort of cooperation among sellers or buyers.

During the middle ages, also, it was possible to observe oligopolistic and oligopsonic practices, used to stipulate the minimum gain for producers or a maximum price for goods. At that

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[8] Translation: "Trade and traders have their own interests which very often do not coincide with those of society. Therefore, they eventually created its own class, which required special treatment and privileges. History has taught us that business cannot persist without rules and that the degree of improvement of the standards of economic law directly affects the development of the country. It is also true that, by moving so much wealth and so many people in that activity, conflicts of interest are not only common but also usual. So, since the beginning of mankind, man and society realized the need for a special law and set rules for trade and their agents.*" RAFFAELE, Mario S. L. D.: *La perfección del Instituto de la Obligación en el derecho económico brasileño ante el nuevo tratamiento legal internacional de los contratos por medios electrónicos*. Universidad de Deusto de Bilbao, pp 50-51. Bilbao, Spain. (2005)

time, those commits had a slightly different aspect. As production was much more difficult than nowadays and logistic had high costs, there was too much personal approach on the commerce, and oligopolistic practices were based on long-term contracts and personal trust, as described by Badalian and Krivorotov (2010) :

> *"(...)long-term contracts were central for medieval oligopolies. They efficiently joined buyers and sellers together in an intricate mutually dependent network, fully dedicated to locating, mustering and then delivering all the available supplies in the most cost advantageous way possible, in order to satisfy the thirsty market. However, they paid for these efficiencies by increasing their internal rigidity. As supplies improved with the entry of new producers, the economic conditions gradually evolved to shortages of demand in the Late Middle Ages (...). The oligopolistic bodies built to deal with supply shortages were ill equipped to handle this new task."*[9]

Nineteen forty-five was crucial year on the debate about cartel social losses and gains. With the end of the World War II and the rise of the USA as an economic superpower, North American capitalism became a model in regulation. Before this, most of the world's capitalist countries, and even the U.S. assumed that cartels brought widespread benefits. Backed by the economic new thought, antitrust ideas like Adam Smith's prediction as "*conspiracies against the public*" spread throughout the world and have become the prevailing interpretation.

There are, of course, contrary voices advocating that the social benefits of cartels are higher than the losses caused by them. Jeffrey Fear, for instance, sustains that:

> *"Business historians have shown, however, that this consensus about cartels as conspiracy is historically the exception to the rule, a product of a post-1945 constellation of ideas and events. Cartels are not necessarily the opposite of liberalism and competition, but a variation on them. For better or for worse, they shaped economic and business history since the late 19th century. From the company perspective, joining, managing, or combating cartels was a major entrepreneurial act. Finally, business historians have shown the varied effects and services provided by cartels (quality standards, technology transfers, or risk management) that extend beyond the conspiratorial motivation to raise prices."*[10]

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[9] BADALIAN, Lucy et KRIVOROTOV, Victor: *The Amazing Synchronicity of the Global Development (the 1300s-1450s). An Institutional Approach to the Globalization of the Late Middle Ages.* London School of Economics. London, UK. (2010)

[10] FEAR, Jeffrey: *Cartels and Competition: Neither Markets nor Hierarchies.* Harvard Business School. Boston, USA. (2006)

Although it is undeniable that cartels extend beyond the conspiratorial motivation to raise prices, it is just a side effect which does not justify the social costs. It would be too naïve to believe that oligopolies are built to benefit consumers, and as an undesirable result, prices rise. It would be a total inversion of cause and consequence facts.

Moreover, in order to consider that cartels are not, necessarily, the opposite of liberalism and competition, but a variation on them, strong theoretical restrictions will be needed, since this statement is true only in a few tiny exceptions but it is false for the market as a whole.

Nowadays, cartels, trusts, artificial oligopolistic and oligopsonistic practices are spread throughout the world economy, especially after the establishment of a global economy as the mainstream, where companies are acting beyond state borders. That means foreign to local rules, being much easier to frame cartel structures outwitting national authorities to protect free competition. Cartels are no longer restricted to standard price combinations made in a table of a tap-house, as the Adam Smith's quote in the foreword, but they can be represented in many compliances and factions such as vertical, horizontal, regional, sectoral, etc... Neither are they restricted to good markets which reached the final user, but they are also in the markets of commodities[11], services, health, justice, education, even in illegal products markets such as drugs or human organs. They arrived as far as official international organizations constituted by sovereign states, sometimes hidden under the cover of general or public interests. Others throw open as the main reason for the association itself, without any international organization or controlling agency's dismay.

On this scenario, this thesis aims to contribute to the free market not only as a theoretical presupposition of the capitalist system, but as a competitive global market structure.

1.3 – Distinctive Features of Oligopsonistic Cartels:

Cartels are often difficult to notice, and the better hidden, the better they function, exactly because its stealth is the key to its success. Collusions among businessman in prices, market share, geographic area and so on are against law in a major number of countries throughout the world. Techniques used by businessmen to erase clues of collusions among them and outwit

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[11] Which are actually the most common for being a natural and irreplaceable resources and bought not for final consumer but for middlemen or speculators instead.

competition authorities are refined and make the task of detecting, persecuting and punishing cartel members tough.

However, this necessity of hiddenness is a double-edged sword; it makes cartels operative but at the same time it makes them less reliable and clear for its members. Cartels, even when involving astronomical sums of money, are merely based on tacit, oral and covert agreements that are made during social interactions among the oligopsonistic / oligopolistic firms' CEOs. So punishments for disrespecting cartel rules are unknown and sometimes they involve threats, violence or even murders against the deserters. It is only one reason more why states must act preventing and dismantling these Mafia.

Imprecision and unpredictability are only two of the ordinaries obstacles to collusion of firms, but there are many others. Three further common hindrances are: differences in demand, cost of production and logistic. Firms that serve different geographic markets will have varying levels of clients, and in many cases, they will also have different efficiencies and deficiencies, resulting in different production costs which will present an intricate obstacle to collude in final prices. Another limitation must be pointed out: if economies of scale are steep for an industry, then smaller firms have no other option than aggressively compete on price to increase their market share. On this scenario, there is no other way to earn reasonable profits, unless in the unlikely situation where the small firm receives its market share or any sort of compensation from the big ones. In such cases the establishment of a stable oligopoly would be doable, but it is absolutely irrational expecting this behaviour from the big companies towards small ones.

In the most likely scenario, it will be complicated for the firms to agree on the price, because they will have different marginal cost curves, thus, it would not be easy for a disadvantage company to accept a price that would be suitable for high efficient corporation. Consequently, there is a huge temptation for efficient producers to swindle cartels agreements and if they act like deceitful members in relation to their partners in cartels they advance towards a monopsonistic scenario, which is even better for them, whatever the uncertain and dangerous[12] sanctions.

In oligopsonistic scenarios there is a key difference: enterprises are agreeing in costs, not in prices, which make cartels much easier to come to terms with and much more reliable for its members to believe that informal agreements will be kept. On the other hand, it is much more difficult for antitrust authorities to detect them.

Another potential barrier to collusion is the price levels. Excessively high price levels, may encourage new entrants into the industry increasing the competition, or, smaller firms without

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[12] In chapter 2.4 of this research, we analyse all the possibles outcomes when a deserter company breakaway from cartel price policy.

much market power can practice lower prices policies and increase their production in order to find their market share.

In these cases, oligo-structures expand its initial purposes, that would be price agreements, to construct entry barriers. Once again showing how harmful oligopsonistic cartels can be for the economy and how difficult their detection and prevention are. However, this scenario is impossible for the producers in an oligopsonistic market, because if every single producer was selling their commodities for a very low "X" price compared with a hypothetical equilibrium price, this market would never be attractive for a new small entrepreneur to get into for a price even lower than that paid by the oligopsonistic cartel.

Another fact to be mentioned in cartels is that the possibilities of betrayal increases significantly in recessions. During these periods, when demand declines, a firm's marginal cost are expected to decrease and the demand curve moves to the left. In free market competition, firms' first reactions are often these three, in order: 1. reduce stocks; 2. Reduce production (labour and capital resources); and, eventually, 3. decrease prices;

The last one, in oligopolistic situation, is not possible without the consensus of cartel members. In a realistic set-up, it is not only possible, but extremely likely that a firm with more capital savings uses the veto against other members, making the whole market fall deadly in sales, which, logically, drive some companies to bankruptcy, but those with less capital saved go first, leaving their market share behind for the others with more capital saved.

In an oligopsonistic setting, these states would not have the same consequences because the stimulus in a recession is opposite to the one in an oligopolistic market. Actually, oligopsonistic cartels tend to strengthen their laces under these conditions in order to buy at that lower price. This adds one more reason which shows us how powerful the oligopsonistic cartels are and how tricky the task of preventing and dismantling them can be.

An additional point to be introduced is that a market with a large number of firms in the oligopoly makes it difficult, both, to create and maintain collusions. Classical literature in economics indicates that in a sector where not more than half-dozen firms rule at least 85% of the whole market, it is fairly easy to collude to set prices or to limit competition. However, if there are more than six firms with a smaller share of the market, then collusion becomes increasingly complex. Of course, there are several exceptions based on the type and structure of market which are being analysed, but, indeed, there is an inescapable trade-off between a number of firms and cartels: the likelihood of a successful collusion decreases as the number of firms increases.

The last major barrier to collusion to be mentioned here and the most important one, which inspired this thesis, is the antitrust law. Most contemporary states prohibit collusions in their

legislations, since it is against the social interest and it causes many damages in production and consumption. Of course, as always, there are few exceptions predicted into the own antitrust law. Generally speaking, legislations are very well done, however, what need to be improved are the systems to detect and prove cartels, and this research aims to assist on this task.

1.4 – The Inception of Antitrust Policies and its Hindrances:

On April 8th, 1890, by an almost unanimous voting with the score of 51–1, the senate of the USA approved a bill of law, dubbed Sherman Bill, which was posteriorly submitted and approved by the House of Representatives on June 20th, 1890, this time in a historical unanimity vote of 242–0. After some red-tape procedures it was sent to the White House and only twelve days later after being approved by the US House of Representatives on the July 2nd, the president, Benjamin Harrison, signed the bill into law, approving the first North-American federal law against cartel practices which became widely known as Sherman Anti-Trust Act[note1.4.1]

The Sherman Act can be considered not only the first North-American law to prevent oligopolistic market failure, but also the first world's law which allowed a national government to investigate, prevent, punish and combat cartels systematically.

Several states of the American confederation had previously passed resembling laws against trusts, although they were for specific economic sectionals or economic sectors, geographically limited and they had minor extension, being applied to intrastate businesses only.

The Sherman Antitrust Act was based on the constitutional power of the North American congress to regulate internal commerce. Senator Sherman helped to understand that trust practices were noxious for the regular development of the commerce and the free market. Although he assumed some economy of scale gains, the senator advocated that these associations bring more damage than benefits for the society.

Trust was legally defined as: *an arrangement by which stockholders in several companies transferred their shares to a single set of trustees;* in exchange, the stockholders received a certificate (*the trust*) entitling them to a specified share of the consolidated earnings of the jointly managed companies. The trusts came to dominate a number of major industries, destroying competition among them, rising prices, concentrating capital in hands of the trustees who used it to

create thresholds to new competitors because of the dumping actions and huge economic power they controlled.

According to the classic economic literature, cartels present many inconveniences in a structure of free competition market. One of the main problems of the cartels is the use of savings they make handling the market, selling goods or providing services, over market equilibrium price, which allows cartels to sell goods under a manufacturing costs or provide services for a non-attractive price for a gap necessary to drive new competitors to bankruptcy, when they come back to the over prices levels.

It is important to notice that those gaps, where trusts make dumping, are always exceptional, insignificant when compared with time they are over the price market and it will be graphically shown in the next chapters.

A remarkable case of trust agreement took place eight years before the Sherman Act, on January 2nd, 1882, and it was one of the economic empirical pillars to sustain the necessity of antitrust law in the USA. Following the ideas of the attorney Samuel Dodd and with the support of Rockefeller bros., having John Davison Rockefeller as the chairman and his brother William Rockefeller as executive, the S.O.C. (Standard Oil Company) in New York became S.O.T (Standard Oil Trust) in the State of Ohio. It was a board of trustees set up not only for production control of natural gas and oil, but also for the distribution of them in Ohio and neighbouring states. All the standard properties, in the number of nine, were placed in S.O.T. hands sharing among stockholders, who received 20 trust certificates for each share of S.O.T. stock.

All the profits of the component companies were sent to the nine trustees, who determined the dividends and elected the directors and officers of all the component companies. This allowed the Standard Oil to function as an almost monopoly since the nine trustees ran 90% of the component companies of the sector in the USA. They had 60.000 workers and controlled many rail-roads around the territory. Of course, there were some economies of scale, but the outcome of it was not transferred to consumers, prices felt down only when there was an exogenous downsize in demand, but never to the level of a free competition market. That can be proved by the difference between international and North American prices in oil and natural gas, which were always negative, and consumers' losses were bigger than possible gains with economy scales, which were reverted to the owner: John Rockefeller became the richest, most powerful and influential man on earth.

Concerning that, the Sherman Act came to light for authorizing the Federal Government to institute proceedings against trusts in order to dissolve them. Persons forming combinations were subject to fines of $5,000 and a year in jail. The law declared illegal: *"Any combination in the form*

of trust or otherwise that is in restraint of trade or commerce among the several states, or with foreign nations".

20 years after the Sherman Act, the S.O.T. was dissolved creating 34 independent companies, some of them are still working nowadays such as Exxon, Chevron, Atlantic, Mobil and Amoco.

However, the path of the Sherman Act, turning state law into federal law was not a straight line filled of successful trials. Only five years after the bill become law, the Supreme Court of the USA dismantled the Sherman Act in a remarkable trial of the United States vs. E.C.Knight Company (1895) which got into law and economics history as the Sugar Trust Case.

The Supreme Court of the United States of America sentenced that the ASR Co. (American Sugar Refining Company), even though the company controlled about 98% of all sugar refining, had not violated the law. Per the SC the company's control of manufacture did not constitute a control of trade.

The court's ruling on E.C.Knight Co. could be read as an end of government's trust regulation, however, despite of this, during President Theodore Roosevelt's "trust busting" campaigns at the turn of the century the Sherman Act was used with considerable success.

A few examples can be found in law and economics history: In 1904 the court upheld the government's suit to dissolve the Securities Market trust in the case of State of Minnesota vs. Northern Securities Company. By 1911, the American president William Howard Taft had used the act against the Standard Oil Company and the American Tobacco Company.

About a century later, in a remarkable suit of the late 90's worldly known as another effort to ensure a competitive free market system, the Federal Government used the same old Sherman Act against the giant Microsoft, a computer software company. This time, more than other the effects were felt on the entire world market.

Another thing to be pointed out about the Sherman Act is that the state was not the only one viewed as a lonely victim, Individuals and companies suffering losses because of trusts were permitted to sue in federal court for any damages.

The Sherman Act was very well designed to restore competition, especially when considering the time, it came to light. On the other hand, it was loosely to prevent monopsony and oligopsony practices and failed to define such critical terms as *"oligopoly", "combination," "trust," "conspiracy," "monopoly", and; of course: "oligopsony", "duopsony" or "monopsony".*

Actually, the Sherman Act came to fore in 1882 in order to protect economy from trusts and cartels however, it would be impossible to wait more than that, seen that even two centuries later, accounting decades of law and economics knowledge accumulated, oligopsony and monopsony

cartels markets are undervalued in damage impact on society development, scientific researches and governmental prevention. Under these circumstances no mentions about them could be expected. However, its influences are worldwide sensed[Note1.4.2]. On the old continent, since 2008, the Directorate-General for Competition of the European Commission (EC) through the Leniency Program encourages companies to hand over inside evidences of trusts or cartels to destabilize and detect them. In Brazil, since September 10[th,] 1962 the bill of law n. 4.137, *Conselho Administrativo de Defesa Econômica* (CADE) is established to protect concurrence and punish trusts and cartels practices.

The Sherman Act was limited to oligopoly, duopoly and monopoly structures. Notwithstanding, it is undeniable that it was a giant leap for law and economics market regulations.

Chapter II – Endogenous Characteristics of Oligopsonistic Settings:

2.1 – The Stimulus for Oligopsonistic Behaviour:

Oligopsonistic practices are an expected behaviour of the middlemen insofar as they readily realize the natural incentive they should increase their profits with putting less effort on it. As long as they have a huge oligopsonistic capacity of market control, they just need a simple and momentary marking down in price below the market line they normally pay for and a while-lasting price mark-up put above the price they used to sell for final consumers.

These up and down cycles of outliers in standard price markets have a Pareto optimal and they need to have control of that gap. But once they handle a huge proportion of the supply for the final consumers and an extensive demand control of small producers it is perfectly feasible.

Ferrer (2010) evinces that[note 2.1.1]:

"*Un efecto negativo adicional lo encontramos en el caso de los intermediarios locales en el sector agrícola de nuestros países. Generalmente operan como introductores exclusivos de las centrales de abasto lo cual les da una posición monopsónica y oligopsónica que los productores no pueden romper. Esa posición les permite comprar a precios tan bajos que impiden la capitalización de los pequeños y medianos agricultores y vender a un precio tan elevado que reduce las posibilidades de consumo del demandante final. Todos conocemos la diferencia tan grande que existe entre los precios a los cuales nuestros campesinos venden a los intermediarios sus productos y los que pagamos finalmente los consumidores. La diferencia es tan amplia que no permite la capitalización del sector agropecuario y reduce el nivel de consumo de las familias en general. Como en este proceso infra demandan e infra abastecen, generan desperdicios enormes que se materializan en miles de toneladas de alimentos descompuestos tiradas diariamente a la basura por falta de inversión en equipos e instalaciones que permitan su conservación*".[13]

It is a strong incitement for intermediate agents who naturally realize that this rational incentive, where a price mark-up decision, which is in their hands, can make them take more advantages out of the market putting less effort on it.

Thus, even if the graphics and equations which explain oligopolistic and oligopsonic behaviours and its losses for society as a whole came many centuries later with the collaboration of great economists, it is easy to understand why those practices were shoulder to shoulder with commerce activities thousand years before the Industrial Revolution and justify why those practices perpetuated throughout the centuries up to now.

Schackle (1983), in his book *The Years of High Theory: Invention and Tradition in Economic Thought 1926-1939*[14], used the expression "Marshall Dilemma" to explain the references of problems which appear for reconciliation between competition and increasing returns to scale. This approach is not common in quantitative analyses on current microeconomics theory, explaining the average cost curve long term "U" proposed by Pigou, and more advanced texts that formulate a non-competitive general equilibrium in oligopolistic or oligopsonistic competition.

The first graphic representation about oligopoly came just after those which explain the equilibrium price where supply and demand equations are balanced and coincident in one point on the bi-dimensional space. Of course, the explanations seen from nowadays appear awfully shallow; however, it is important to remind that those were just the first steps toward a comprehension of that oligopoly and, posteriorly, oligopsony phenomena as market failures.

Regardless its simplicity, the stimulus for a cooperation among producers were quite well visible on those graphics which basically said that, controlling the supply, it would be possible take more benefits out of investments with less effort, as seen below adding a new curve (S'):

Graph 1 - Supply Control in oligopsonistic market:

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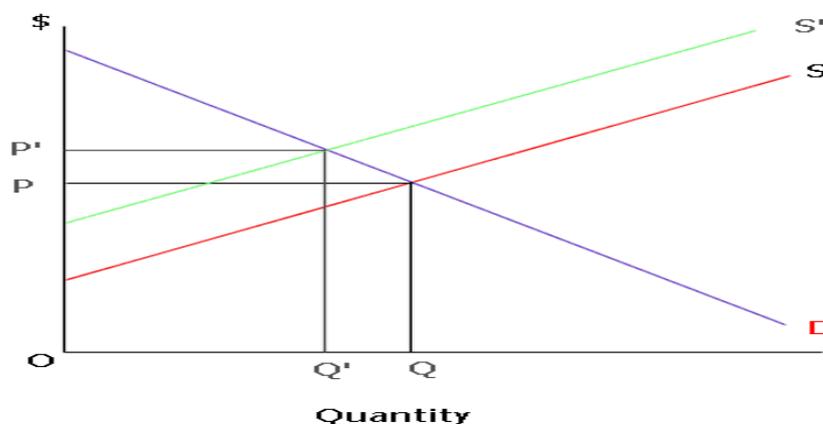
[14] SHACKLE, G. L. S.: *The Years of High Theory: Invention and Tradition in Economic Thought, 1926-1939.* Cambridge Press. Cambridge, UK. (1983).

As the economists were showing graphically, there is a strong rational stimulus towards oligopoly, duopoly or monopoly practices on the markets as represented above by the triangle drawn through the intersections among the curves D, S, S'; the triangle points are: D=S, D=S', Q'=P. That area measures not only the gains of the cartel agents, but also the losses of consumers, which means, consequently, a side effect of governmental and social losses. It means less production, less jobs, less work, less goods, less taxes, less consumption in trade of more profits for a small group of producers.

Even if most of producers and suppliers were not aware of this graphic, the logic behind it was there, easily perceptible by the agents who assume that they can reduce their effort and increase their profits and what they need to achieve was a simply association among them.

Many Economists tend to underestimate oligopsonistic practices and some go further, insisting that oligopsonistic agreements cannot be considered as a market failure as the market itself finds the solutions for this "back-set", refusing even to use the word "problem" for this situation.

For those Economists, the best action against oligopsonistic practices would be no action at all. Actually, in several countries oligopsonistic practices are stimulated under the form of cooperatives. The legal combat is limited only to oligopolies; however the logical behaviour behind the conduct is exactly the same and in a free market with perfect concurrence it is as destructive as oligopoly.

The graphic bellow shows the marginal costs and oligopsonistic behaviour:

Graph 2 - Demand Control in Oligopsonistic Market:[15]
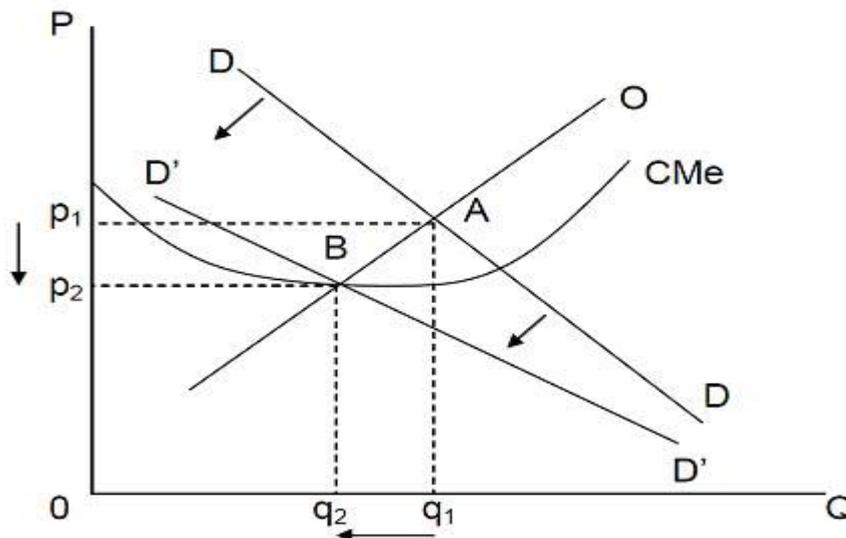
In the graphic above, the effective demand is represented by the curve "D" which meets the curve "O" (Offer, Supply), previous of oligopsonistic[16] action at the original point "A" where the previous marginal costs curve passed through, in perfect market equilibrium.

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[15] FERRER, Carlos Encinas: *Teoría Económica.* SABES, 2ª. ed. DF, Mexico. (2004)

After the oligopsonistic agents' interference it is possible to observe that through their intervention in the market, sellers are forced to reduce prices changing the demand curve from D into D '. This change not only decreases prices, but also makes the curve more elastic to price variations.

By doing so, the middlemen get a lower price (p2) with a lower quantity demanded (q2), contrariwise, and recording that oligopsonistic practices are only made by intermediated but never by final consumer, in the new scenario which emerges from that situation, there are less goods in the market and the same demand, which constrains prices to raise up.

That is a win-win situation, but only for the intermediates. All the losses are shared between consumers and producers. Graphics are made by and to economists to understand economic behaviour better, but the agents swimmingly read the market and act to take the most out of it with the less effort possible. It would be naïve to believe that producers or suppliers would do that to provide better services or products for the consumer, even if they had less profit in their activity.

Along history, what we see is that all types of cartels are made for the benefit of their participants, not for the welfare of humankind, and the costs never cover the social benefits. Economic history is full of examples of cartels, not only regionals made by companies, but also global and made by sovereign states. Although from time to time protecting people or strategic economic sectors are the official pleas, most of them are never built or thought to succour consumers or societies, but always to manipulate market prices under the cover of a noble cause.

Notwithstanding, the fight against all kinds of cartels depends on a previous and far more complicated battle which is still not totally won, seen that, although graphics and equations show clearly the social losses of a cartel, there are ideological elements inside of this debate which prevent authorities, think tanks, researchers and police makers to go further in this quarrel. The grant of Economics Nobel Prize 2014 to the French Professor Jean Tirole, who dedicated all his academic life to the research in cartels and trusts is a giant leap for law & economics science.

Moreover, when the discussion comes to oligopsonistic practices it is even more complicated because its effects, albeit as destructive as oligopolistic practices, they are off-screen, sightless for consumers and regulatory authorities. Even in academia the number of researchers and scientific publications are negligible when compared to those dedicated to oligopolistic practices

In the next section, we analyse the beginning of antitrust actions, its hindrances and how this thesis can help to better understand the phenomena of oligopsonistic practices and vouch that they are being practised.

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[16] Curves(equations) for duopsonistic or monopsonistic situations would have the same behaviour, the difference would be restricted to the intensity and elasticity. In those cases, they would be increased positively proportional to the number of sellers and their savings to operate in loss.

2.2 – Oligopsonistic Innate Demeanour and Substitution Effect:

In order to explain the behaviour behind the formula, or the logic behind the behaviour, it is necessary set up a first finding: substitution effect cannot be applied as one single assumption for all different settings that consumers can befall in real world.

"A Class" consumers have a strong power of choice when compared with "E Class", and this power is even stronger when it comes to superficial goods markets, where "E Class" has no access. On these markets aforementioned, the power of intermediates is sometimes greater than the suppliers' one.

That said, it is possible to assume theoretically that the consumer's power of choice, on the limit of subsistence, is null. It is of course theoretical but only because it is not possible, nor even desirable or acceptable that, for scientific research proposals, human beings are pressed to subsistence levels so that their behaviour could be systematic compiled and analysed.

However, here and there in history, in war periods or natural disasters, human beings were involuntarily submitted to extreme conditions, and although direct evaluation of the forgoing theory is difficult and imprecise, the sight is enough to conclude that utility comes into a picture where agents have something up to minimum economic conditions where he / she can take his / her decision based upon his / her better interests, not in a strict necessity, pressure or desperation.

Based on that, some economists suggest that even animal studies are useful. Chen, Santos *et all* (2006) published a study about Capuchin's economic behaviour. The study was carried out gathering a colony of monkeys together in a cage and teaching them to use currency which Chen settled on a one-inch silver disc with a hole in the middle. A few weeks later the monkeys were able to understand the system; the experience turned out that Capuchin, individually analysed had strong preferences for different treats.

The following step was to introduce price and income shocks to the monkeys' economy. Results show that Capuchins responded rationally to the basic law of economics: when the price fell, they bought more and when the price rose, the monkeys bought less. Other experiences[note2.2.1;] were made with the Capuchins and the general conclusion is that:

> *"The fact is that similar experiments with human beings — day traders, for instance — had found that people make the same kind of irrational decisions at a nearly identical*

rate. The data generated by the capuchin monkeys, Chen says, "make them statistically indistinguishable from most stock-market investors." So the parallels between human beings and these tiny-brained, food-and-sex monkeys remained intact."[17]

Other animal empirical experiments[note2.2.2] checked the choices of rats in trials that focus on the discrepancy between essentials and luxuries; for the experiences on necessities, rats press levers that deliver the only available supplies of water and food. Scientists fixed the total number of lever presses creating a bounded surface pretty much like income and the number of presses for each commodity is varied to alter the slope of the budget constraint much like prices. The trials for inessentials are similar except that ample supplies of food and water are regularly available and the inessentials are commodities like fine drinks or expensive food. Scientists find that:

"*Essential commodities are determined to be gross complements, while non-essential goods are independent or gross substitutes. This conforms quite well with the tri-partite division of goods where essential goods are gross complements and inessential goods are gross substitutes.*"[18]

Necessity and Luxury however might be discerned by humans considerably different than animals and ascribe a wide range of social values to the distinction, precisely because of that price discrimination is possible and it is a potent vehicle which allows the establishment of cartels and groups of market dominance with a relative small effort due the consumers/producers asymmetry of information. Moreover, the effect of changes in prices and incomes is to change consumers' choice of a luxury good over a cheaper substitute.

According to Maslow's Hierarchy of Needs[19] (1943) the perception of luxury is variable and imprecise whereas necessity shows some logical lines such as water and food come on the top list whilst shelter comes lower and transports further down; computers and mobile come in the same level. Therefore, human perception of necessity might not fully conform to the behaviour of lab rats, notwithstanding they are more logical than luxury perception. A paper of Taylor, Funk and Clark (2010) made a comparison of "Luxury and Necessity" in an interval of one decade (1996-2006) in the USA society and it indicated some coherence in consumers' choices, only adapting to new technologies[20]. Also, interesting Taylor et al. (2010) conclusions that necessity and luxury can be

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[17] LEVITT, Steven D. *et* DUBNER, Stephen J.: *Superfreakonomics. Global Cooling, Patriotic Prostitutes and why Suicide Bombers should buy a Life Insurance.* HarperCollins Publishers. NYC, USA. (2009)

[18] LEVITT, Steven D. *et* DUBNER, Stephen J.: *op. cit.* 2009.

[19] *Pyramid of Human Necessities.*

[20] TAYLOR, Paul; FUNK, Cary *et al.* :*Luxury or Necessity? Things We Can't Live Without: The List Has Grown in the Past Decade*. Pew Research Center, USA. (2010)

interchanged throughout time:

> *Some of these goods, such as home computers, are relatively recent information era innovations that have been rapidly transformed in the public's eyes from luxury toward necessity[21].*

In the same way, one study carried out by Kemp (1998) states:

"Humans are asked to rate goods on a 9-point-scale as luxuries or necessities with 9 being a complete luxury and 1 a complete necessity. They are then asked to forecast their relative demand giving a doubling of the price of the good. If demand falls by less than half then 9 we differ on the assignment of independent goods. We claim independent goods are essentials, they argue these are inessential. A careful reading of their paper though indicates that the conclusion depends on the failure of the data to reject the null hypothesis of independent goods. Therefore, their conclusion may represent data limitations and is not necessarily in conflict with our theoretical result. If we eliminate the goods given a rating of 4.5 to 5.5 then 12 of 15 goods are rated consistent with our theory: luxuries have elastic demand and necessities inelastic demand. Given the aggregation result in (20) necessities are gross complements and luxuries gross substitutes so that in fact the human and rat studies line up quite well."

By no means researches in animal economic behaviour should be taken as conclusive or complete, nor could be the ones made by posterior observations during the war periods or natural disasters. Notwithstanding, such researches can help to understand the general idea.

In the first case, anomalies are expected because unlike natural sciences, in human ones' variables between human beings and animals are never totally under control. These experiments have the power to enlighten conditions of human economic behaviour but they cannot be taken as conclusive, because many anomalies are left to explain.

In the second case, the conditions do not allow technical and methodological rigour to assume conclusions as pure economics science, however, as aforementioned, the same reasoning can be used. There are several areas where further work is necessary and may produce contrary results. For example, necessities come in many varieties and given the presence of one variety the others may be inessential. Different sources of the same drink, different flavours of the same food, can be close substitutes for each other even as the group is essential.

We concluded that some form of aggregation into goods that serve to needs will ultimately prove fruitful. For a oligopsonistic analysis, that is the core idea of this research, is simply

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[21] Op cit: TAYLOR; FUNK *et al.*: 2010.

to understand middlemen acts: If either of two goods may be driven to zero, but not both, then the goods are different varieties of the same essential aggregate and final consumer can be charged differently. We have strong support to the general theory of the cycles in oligopsonistic markets in this thesis, but this is one more trace which will allows us to structure the whole idea, although the difficulties in part given to the slant based on substitutes and complements that we encountered real in markets.

2.3 – Price Elasticity and Imperfect Competition:

A more realistic scenario and a key issue for this thesis is the analysis of price elasticity of demand in non-competitive markets. Empirical observations in literature demonstrate that free competition is exception in real settings. Markets are, most of the time, submitted to some sort of competition failure. It is vital to understand how firms behave in an oligopolistic configuration of market if they must consider the likely responses of their rivals, revenues and consumer's decisions.

First, it is necessary to clarify that there are 2 different sorts of non-competitive markets: cartels (and its derivations, such as trusts or holdings) and oligopolies (including duopoly, excluding monopoly[note2.3.1]). On the first model aforementioned, there is no competition at all; in the second one instead, it is admissible a variety of imperfect competition, in particular when firms are unaware of others firms price police or when the Cartel is officially defined by Law.

The importance of non-price competition under oligopolistic/oligopsonistic structure predicts that firms will tend to prefer a share of market competition rather than price war due to the self-defeating outcome of it. Non-price competition leads chairmen to use other policies to increase market share such as advertising, marketing, brand loyalty, promotional campaigns, better quality of service, guaranteed delivery times, low-cost servicing agreements, 24hour on-line and free toll telephone customer support, discounts, upgrades, preferential access, fidelity rewards, etc; in case of oligopsonistic markets, the most common strategies are: longer opening hours for retailers, contractual relationships with suppliers, franchises agreements, exclusive distribution agreements.

All these strategies imply in a huge spending for many firms involved in the market, and sometimes they even overcome the losses with an eventual war price, hindering tactic of a profit maximizing, which, in the end of the day, is the goal of every business. A market strategy is only profitable if the marginal revenue from any extra sales exceeds the cost of the plan and marginal

costs of producing an increase in output. Promotional campaign however is rare, if not null, in oligopsonistic structures; it is not always easy to measure accurately the incremental of buys for a specially increasing in prices of the commodity demanded.

Another characteristic of non-competitive markets, in particular: oligopsonistic, is the strong presence of entry barriers contrived by exclusivity contracts. Start-ups trying to break into an existing oligopsonistic market are virtually impossible, unless they have massive savings to operate for a long while in red or they manage to undercover operations with suppliers to have a competitive price to put their product in regular market price. Apart from that, start-ups face brand loyalty to the existing products in some niches, making entrepreneur's step into oligopolistic / oligopsonistic markets even harder than it already is. Although this characteristic is rather common in first than in the second one, it however reinforces in both cases the entry barriers. When brand loyalty is well-built, the cross-price elasticity of demand for price changes between two substitutes weakens and a smaller number consumers will switch their demand when there is a change in relative prices in the market. Robust brand loyalty makes it easier to charge premium prices and benefits from supernormal profits in the long run because loyalty become a strapping barrier to entry into the market.

In the other hand, a technique which is well used in oligopsonistic competition is acquiring a right to buy quota of commodities from suppliers and so step into the oligopsonistic structure without a price war; to operate this technique however it is also necessary a substantial initial capital to buy it and there is no guarantee that will not have a price war in the other extreme, when the new company will put its products into the market.

Of course, all these *modus operandi* are illegal so that they are undercover and hardly detected, nonetheless, as explained in the "Methodology" of this research, it is a theoretical construction to help prevent and prove the existence of oligopsonistic cartels, not an empirical examination.

With all this said, if a company wishes to change its price policy in a non-competitive environmental, it must to understand that competitors will react differently than in a free competition situation; additionally, and extremely vital for this research, the outcomes in final prices of those reactions is a key clue which will indicate not only the existence (or not) of a oligopolistic/oligopsonistic market, but also which form it assumes.

In non-competitive markets, there is an even stronger incentive for not going into a price war as we show next. Changes in price policy, of course, admit only 2 classes: increase or decrease it. According to economic scientific literature, likely reactions will depend on the sort of oligopoly / oligopsony structure where the firm is; if it is an ordinary one, competitors have 1 reaction in case

prices decrease and 2 reactions if prices increase.

If a firm raises its prices in a natural oligopoly/oligopsony, competitors can decided between keep their old price level and so invest in their production capacity to support the increase in market share or match the competitor new price stand, escalating profits, although it is not 100% of the difference between new and old prices, because it implies in market shares losses due to an inelastic demand towards price in natural oligopolistic / oligopsonistic structures of market[22] and also because it will depend on other competitors reactions.

If the divergent company in an ordinary oligopoly/oligopsony market dwindles price levels, not following this policy will make the revenue declines roughly due the almost perfect demand elasticity in this specific situation, with the exclusions aforesaid.

When price changes come to artificial oligopolies/oligopsonies structures of market, in case of raising price level policy of the breakaway firm, the 2 options aforementioned for natural oligopolies/oligopsonies markets remain the same. However, when it is a falling price level policy, which is the most common one, so reactions are more complex and they can be divided in 3 main possibilities as follow.

First analysing competitor reactions for increasing price policy, which is the less common one, they will have, as said, 2 expected reactions: 1st: the other firms will probably not follow this policy for 3 main reasons: in oligopolistic/oligopsonistic markets there is price/demand inelasticity due to pattern services or goods and price stability, which causes consumers inertia to follow a firm out of indifference price zone[23]; the 2nd reason is that a competitor rising prices alone will allow cartel participants to take its market share without breaking their internal codes. The 3rd reason is macroeconomic: in cartels arrangement prices are already in high limit to maximize firm's profits and a rising price police further this edge can origin an outbreak in the specific market.

Analysing the decreasing prices policies, which are more common in cartels breakaways, the 1st expected competitors reactions[24] is: they will simply ignore the change as long as prices are in a gap of demand inelasticity for price indifference[25] according to Kinked Demand Curve Model of Oligopoly;

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[22] These hypotheses are for natural structures of oligopsonistic / oligopolistic markets, where chairmen do not know the others members' strategy; they do not apply for Cartels and Trusts.

[23] In these structures, demand curve is fully elastic to price changes, since as the firm raises its price, then many of its customers will buy from the other firms, lowering the revenue of the higher-priced firm.

[24] The options are not ranked by probability of occurrence or any sort of classification.

[25] This topic will be analysed in section 2.4 of this research.

The 2nd likely response[26] is a dumping war; since the competitor in an artificial oligopolistic / oligopsonistic market has an informal agreement among them to act in concert, they can punish the deserter firm using one of the Dumping forms of sanctions, given that competitors together have more capital stoked to support longer periods of losses. This is an extreme measure, because, to punish the breakaway company, punishers severely damage themselves as well during the punishment period, although, after the breakaway firm goes out of the business they split among them the new market share; but the real risk in this reaction is leaving a clear evidence for anti-dumping authorities to take measures.

The 3rd possible reaction, which are the most frequent one, as long as the breakaway firm dwindles its price further demand indifference zone and other firms decide not dumping it, competitors will lower their prices to the same level in order to prevent any loss of market share. This creates a new kink in the demand curve, where the variation in demand goes from totally elastic at higher prices policies to an inelastic demand at lower prices policies. Since the marginal revenue curve depends on prices policies, the marginal revenue curve is also kinked. At lower prices level, the marginal revenue curve plunges downward creating a breach. The marginal cost curves of both scenarios will intersect the same quantity being produced by the oligopoly / oligopsony. Therefore, there is no change in quantity produced as prices are lowered; the only change is in firms' profit, if the adjustment in marginal cost is within the marginal revenue gap.

Evidently, this misleading in a specific sector of the Economy does not benefit consumers (in oligopoly) or suppliers (in oligopsony), it, unfortunately, paybacks those who are misleading the market with abnormal profits, justifying State intervention. The war prices can indeed bring few repayments to consumers/suppliers in oligopolistic/oligopsonistic markets, but they are in short-lived periods and in the end, they do not reward the long periods of abnormal high prices in oligopolistic markets or low prices in case of oligopsonistic markets.

Graphically it can be showed as follows: *Graph 3 - Profit Control in Oligopsonistic Market:*[27]

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[26] Not in order of probability

[27] https://karimedalla.wordpress.com/category/joo-nyahh/hl-economics/page/2/
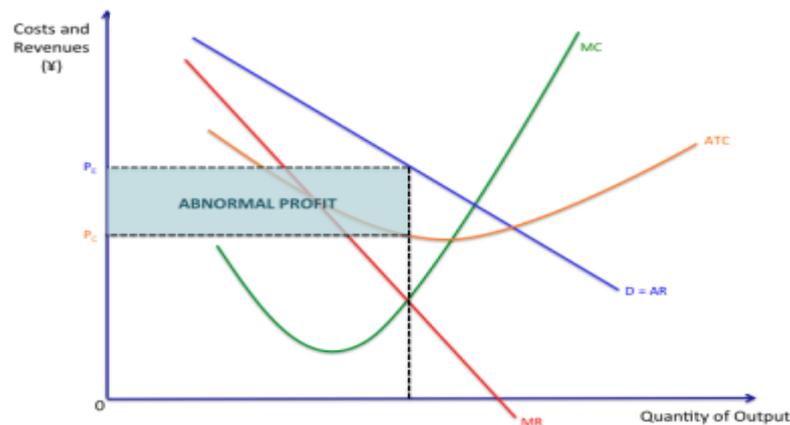
As we can observe, in non-competitive markets, when a firm arises its price(P), the marginal revenue(MR) intersects marginal cost (MC) at a point less than proportional lower than average total costs(ATC). This means that the firm is earning a more than proportional revenue for keeping price artificially high which can only be make with permission (or the absence) of competitors.

Therefore, and for all that was said, there is a truly strong incentive for not going to a price war in hand-made oligopolistic/oligopsonistic markets, and the kinked-demand curve theory explains why firms hardly resist to change their price policy, causing a negative price stability that is going to be analysed in the next section.

A price of a good or service can be economically considered elastic or inelastic regarding demand effects when price change. When a move in price, increase or decrease, has a relatively large effect on the quantity of the good or service demanded, it is categorized as an elastic price of demand. The other way round, when the ups and downs in market price have a minor effect on the quantity of the good or service demanded it is called inelastic. However, in order to be more precise and understand elasticity price of demand better and its effects over oligopsonistic markets it must be said that elasticity cannot be well thought-out as a yes-or-no question. It might rather be evaluated in grades. Goods or services can have a large or short elasticity or inelasticity, or even be perfectly elastic or perfectly inelastic, although these extremes are rarely reported in economic literature.

Starting from perfectly elasticity of demand (price rigidity) or the perfectly inelastic demand, in both edges, even if theoretically possibilities, are unusual in economic real markets, but it is worthwhile to show the limits to understand that among them are ∞ mathematical choices between the 90° that separate them.

The evaluation that will classify a determinate product or service depends on not only mathematical or graphical analyses, but also on dogmatic theoretical studies which change for different markets and industries and from time to time.

This examination is particularly significant for the studies of oligopolistic and oligopsonistic markets, but even more for the second one because in this case handling within the chain of production nearly inconspicuous for final consumers, thus, in this subject, correct use of the mathematical tools is extremely powerful to disclose the existence of hidden forces to lengthen price elasticity from its original limits to a new setting.

As far as economists and jurists are concerned, the major problem in studying these market failures is not only to frame an accurate hypothetical economic theory, but a much bigger challenge: finding the real information to structure that. Agents of a cartel or a trust, of course, work in order to not leave a perceivable clue of their acts in markets where they operate, because it has criminal sanctions and consequences. Moreover, as aforementioned, it is not possible to research with final prices open to the public because differently from oligopolistic markets, in oligopsonistic ones, the price manipulation is inside the chain of production, far from the eyes of the consumers but sensible in their budgets.

Mathematically, price elasticity can be measured by the formula bellow:

Eq. 01 - Demand price Elasticity:

$$\eta = \frac{(Q_1 - Q_0) \div (Q_1 + Q_0)}{(P_1 - P_0) \div (P_1 + P_0)}$$

Described by a "η" as a result of the equation above where the symbol "Q_0" represents the quantity demanded at the beginning of the analysis, or in other words: in the previous equilibrium market point when the price was equal "P_0". The symbol "Q_1", by deduction, represents the new quantity demanded that exists when the price changes to "P_1".

The data in T (time) between the first and the last measure must be well calculated in time series in sequence considering successive measurements made over a time interval, considering all the seasonal waves aspects, which impinge on price variations.

The equation shows us that the demand price elasticity will always be a negative number because of the known inverse relationship between quantity demanded and price. As quantity demanded went down, price went up and vice versa. So, when quantity demanded goes up, price goes down. Price and quantity demanded always move in opposite directions, hence the price elasticity of demand is always negative, but it is important to notice that price elasticity of demand is a plain number which indicates us a percent decrease in price or increase in quantity demanded caused by distortions on the initial market equilibrium; it is not a monetary value which would cause a displacement into the curve, but instead, what the outcome tells us, is the sprain or the distortion from the original situation.

Assuming *Graph1* as *"X"* product or service and *Graph2 "Y"* product or service, it is

possible to observe that as represented in the first graphic that there is more inelasticity than we observed in the second one. We see that there is bigger quantity gained in consequence of price down, thus: *Eq.2 - Elasticity comparison:*

$$(_{Graph1}Q_2 - Q_1 < {}_{Graph\ 2}Q_2 - Q_1) \qquad \underline{even\ if} \qquad \Delta P_{x1} = \Delta P_{x2}$$

This theoretical examination is made for a single product or service inside a specific market, not considering sundry variables in real cases such as consumer incomings, general level of world, national and local economy activity, perfect information access (absence of asymmetric information), product or service homogeneity so that they can be considered as perfect substitutes and perfect consumer mobility. Of course, these conditions are rarely heralded in factual markets causing hypothetical restrictions that we must peel off to build the theoretical basis to analysis the oligopsonistic cartel practices.

When researchers analyse price elasticity of demand, they want to know how elastic or inelastic a particular product or service is to *price variations*. It is a measure of the relationship between a changing in the quantity demanded of a particular good or service when price changes: how far are consumers willing to pay until they move on to the substitute product? Or would they just stop buying it? How many/much more of that good/service would the consumers buy, when the price goes down? Would there be new consumers on this market in case of a price down? It is extremely powerful to understand that behind consumer's decisions, there are oligopolistic/oligopsonistic forces preventing prices to come to equilibrium market.

In competitive markets price elasticity trials, much more the necessity of consumption of a product or service rather than consumers' sense of opportunity, thus, of course remedies or attorneys' assistance are more inelastic than make-up or wine advisors and that is visible and can be methodically evaluated in inter-temporal graphical analyses.

Thus, when there is already an expected elasticity of demand as result of a body of consistent studies, and it changes significantly from the predictable one into a brand-new standard without reasonable and/or seasonal economic explanation, this shift, interacting with another economic hypothesis and considerations give a signal that there is an oligopolistic or oligopsonistic force in action.

So, to achieve conclusions about price elasticity of demand in more realistic state of oligopsonistic backup, it is needed to go deeper into this topic, revising classical theory for price elasticity in multiple markets.

2.4 – Cross Price Inelasticity in Multiple Markets Entourage:

Price inelasticity of demand is a theoretical concept. When it is applied in real markets, the research is classically sponsored by businessman interested in knowing the price boundaries for their product/service and how consumers will react to find the Pareto optimum price that will allow him the maximum profit, therefore, this information is usually evaluated in a single market/industry as we have done in the previous section.

For purely mathematical conclusions, the existing theoretical outlines are well done and allow insignificant criticism that does not modify conclusions when the method is used.

However, for more realistic setting it is necessary to consider other market phenomena such as incomes level, general economic activity, marketing, state of the art or price substitution effect on price elasticity; this last one phenomenon related is less sensitive in oligopolistic/oligopsonistic structure of market because the bunch of options for consumers/suppliers exercise their options are quite small thus substitution effect is scarce felt, but it is there and can bring the research to less truthful conclusions. That is why we must review this observable fact in multiple markets entourage using not only price elasticity but also a cross price elasticity observations.

Cross price elasticity is the effect on the change in demand or supply of one good as a result of a change in something related to another product. Unqualified, it means cross price elasticity: how much the change in price of one product will change sales volumes of another. The cross-price elasticity of product A with product B is:

$$(\Delta QA/QA) / (\Delta PB/PB)$$

Where QA is the quantity sold of A ΔQA is the change in the quantity of A sold PB is the price of B and ΔPB is the change in the price of B.

A cross elasticity may be positive or negative. If the two goods are complementaries, then an increase in the price of one will reduce demand for both. If they are substitutes (e.g., natural and synthetic rubber) an increase in the price of one will increase demand for the other.

The power also depends on the extent to which consumers will be diverted to other products in the face of a price increase (as measured by the price elasticity of demand for the product or service) or lower quality of them. Thus, identifying the structure of the demand for products is central to the analysis of market situation.

The price elasticity of demand measures this directly. However, it is sometimes useful to

identify the set of products to which lost sales are likely to be diverted; these diversion calculations depend crucially on the various cross-price elasticities of demand, whose are often central to the identification of localized competition in evaluating the unilateral competitive effects of mergers.

So, on this new set up, estimated price elasticity of demand (E) is found using inverse demand functions, with price (P) and (Q) being a function of the output variables[28] for $2^{note2.2.1}$ products or services described as (A) and (B) in the times (1) and (2), so in this more complex setting, price elasticity is:

Eq. 3 - Standard Price Elasticity:

$$E_{A,B} = \frac{P_{B,1} + P_{B,2}}{Q_{A,1} + Q_{A,2}} \times \frac{\Delta Q_A}{\Delta P_B} = \frac{\partial Q_A}{\partial P_B} \frac{P_B}{Q_A}$$

According to the mathematical statement model above, it is possible to describe the range of equilibrium price that results from the interaction of demand and supply in whatever 2-option-market with the output variable having been explained by substitution. It is important to stress that the commodities (A) and (B) are substitute products.

The cost and demand-shift variables included in these regressions are typically viewed as exogenous, since they are presumed to be determined separately of the dependent variable and therefore unaffected by it. Moreover, this research revolves around oligopsonistic markets where the cost for shifting the selling of a commodity to the middleman A, B or C is null, except when there are exclusivity agreements, which is forbidden in most internal legislations about Economic Law and international treats.

It is relevant to notice that the presence of multiple cycles in different periods and magnitudes in conjunction with linear trends, can give rise to more complex examination, that are better visualized in a longer-term cycle or a trend, but that involves a specific time-frame, for example: a 2-year-time with daily price intervals. In this sort of simulation, it is needed to observe any of the following trends or trend relationships, as the equation explains:

Eq. 04 - Price Elasticity in multiple markets and different times:

$$p = ßq + δqs + γy + α + ε$$

Where the price of a product (p) is thought to depend on a vector of quantities sold (q) plus the quantity of sales of substitute products (qs) plus and a group of demand variables (y). The fix minimum demanded (α) is given by previous market or industry analysis and (ε) is the error. Some important considerations to be taken into account:

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[28] This equation is perfectly suitable for the proposes of this research, although its range is limited to analyses just one specific market, in Economic Law, Antitrust Litigation prosecute, in major cases, agents who belong to just one niche of the market.

- It is desirable to consider de fix minimum demanded (α) in order to improve the results accuracy since when it is taken into account, the range get smaller, thus only demand variations are influenced by price change, which certainly allows us to reach more accurate results.

- This analysis must be serial in equal time lapses (i.e.: days, weeks, months, trimesters, years...) and collected from various periods of time;

- Additionally, the error term (ε) can be seen to reflect random shifts in demand, marginal cost or conduct by market participants roughly controlled in an equation especially significant where integrals are not used;

- data ought to be applied in cross-section method, to give the multiple-market effects of a commodity policy price on other markets, and the feedback effects from other markets on the one considered;

- It is also important to state that the applicability of this equation presents better results when comparisons are made between 2 markets or industries in the same region (i.e.: cities, states, counties, countries, subcontinents, continents,) or economic areas (i.e. Mercosur, EEA, Nafta, ECOWAS, etc.), to do it in different settings, although not unfeasible, variables must be carefully controlled and systematized; it is one difficulty added, and, results could be slightly less accurate than when it is done in a restrict market/region only.

- This expansion in range aforementioned is proportional to the increase in utility of the mathematical methodology; this recognition is undeniable. Notwithstanding, we believe, considering that the intention of this research which is the study of Cartels in oligopsonistic markets, the expansion of the possibilities does not compensate the losses in accurateness. We affirm that based on the reality of oligopsonistic cartels[Note2.2.2], which, in most cases, present themselves for locals' suppliers.

- With these new variables added, price variations must be analysed comparatively for different markets and artificial oligopsonistic environment, instead of analysis made for one specific niche of market, where linear analysis comparing results in different times are sufficient;

Thereby, the Equation 2(Standard Price Elasticity) is perfectly suitable when the proposes is to analyse a restrict oligopsonistic market/industry; although its range is more limited and specific: 1. For litigation against oligopsonistic cartels; 2. when the agents of the collusion belong to just one particular niche of the market.

Therefore, the gain in complexity does not justify the losses in accuracy when the point is study one exact market/industry.   When, however, it is necessary to compare market/industry among themselves, so the equation for Price Elasticity in multiple markets will be used.

Graphically, in a 2-commodity-market (or industry) characterized for 2 different supply equations (S_1 , S_2) *in red*, and 2 different demand equation (D_1 , D_2) *in blue*, the appearance outward shows as followed:

Graph 4 - Outiliers in Substitute commodities:
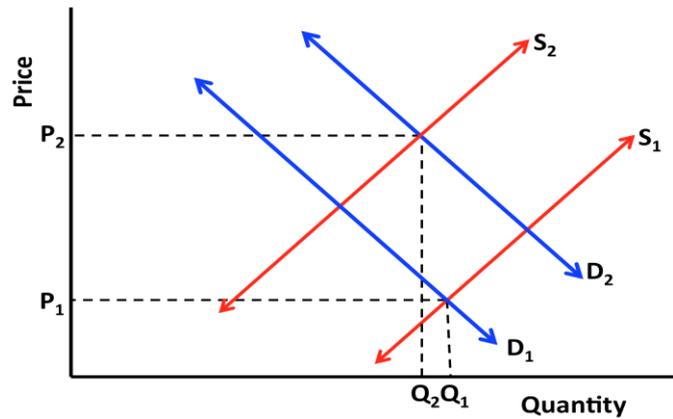
From these initial market/industry situations for 2 substitute it is possible to observe that in typical market conditions:

$$P \in \mathbb{R} = \{f(P) = P_1 \leq P \leq P_2\} \quad \vDash \quad D \in \mathbb{R} \; \{f(D) = D_1 \leq D \leq D_2\}$$

So, all the points inside the box:

$$(S_1 D_1 ; S_1 D_2 ; S_2 D_2 ; S_2 D_1)$$

are expected and normal consumers/suppliers' behaviours, they are customary movements towards substitute product/service with lower price or a middleman who pays a better value for their commodities. Outliers, especially those too far from this trend of price elasticity and out of the box in the 2-dimenson-graphic above illustrated, indicate a surreptitious interference into the market/industry considered.

The out of the box events are economically irrational in a multiple markets environment; it is not a logical adaptation of finite resources to coherent ends when sellers trade their commodities for a price under the market level not pointing for profit maximization, nor consumers paying more that they need for a product or service.

Of course, economics is made by human beings and they are not 24/7 rationales. Louis Boudin (1954) stated that in his article *Irrationality in Economics*[29]*,* but as the author assumes, irrationality is the variable that can change everything when researchers study micro-economically a

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[29] BOUDIN, Louis: *Irrationality in Economics.* in *The Quarterly Journal of Economics*. Vol. 68, n. 4, pp. 487-502. (1954)

specific person behaviour. However, when markets are revised, irrationality is treated as an outlier, as a minor percentage of discrepant data is always expected. Once identified and stratified is possible to assume that rationality is the regular agent conduct and non-rational decisions is a clue, although not definitive, of market manipulation, so these outliers cannot be neglected.

2.5 – Entry, Intermediate and Final Prices Waves:

When a small number of producers try to manipulate market price, in the case that there are other equal options, consumers move forward to substitute goods when prices disrupt the limit of its elasticity, in a normal and justifiable consumer's decision. It also is important to notice that elasticity is a concept which is better observed when products or services are compared among them and conclusions are possible about their behaviour towards price (offer and demand equilibrium).

Moreover, it is equally important to isolate whatsoever variables possible to infer that price variations on one product or service is caused by oscillations on the other one, which can be done using few mathematical tolls especially integral and derivatives. In the same way, it is likely to measure how close or far this relation between them is.

Goods or services are very close substitutes if the cross-price elasticity of demand is high, or, on the contrary, they are far substitutes if the cross elasticity of demand is low. There is no definitive numerical value of cross price elasticity, as aforementioned, that can show us which this limit is crossed or not, it depends on each case by a unique evaluation.

This is very important to understand the behaviour of oligopsonistic agents who test the better price for them until the very limit without final consumer perception, until a partial crash of the sector makes prices raise, causing real inflation and attracting new entrepreneurs for a very controlled and unstable market.

It also is important to clarify that the greater elasticity of demand does not translate into benefits for the consumer but only to the middleman and a hypothetical lopsided market collapse does not affect oligopsonistic collusions since they simple rise prices transferring market shortages to final consumers as real inflation, not affecting profits. However, society (consumers and producers) loses welfare.

The nature and extent of demand substitution can be stated in several manners, but none of them can be used for offering substitution as it is required to identify the gist of oligopsonistic

market. Due the lack of substitution effect, producers are compelled to sell their commodities and consumers are strained to buy anyway.

Therefore, when final price falls, it is possible to assume that there are two unforeseen possible circumstances to portray, as shown in the following graphic: *Graph 5 - Unexpected (p,q):*
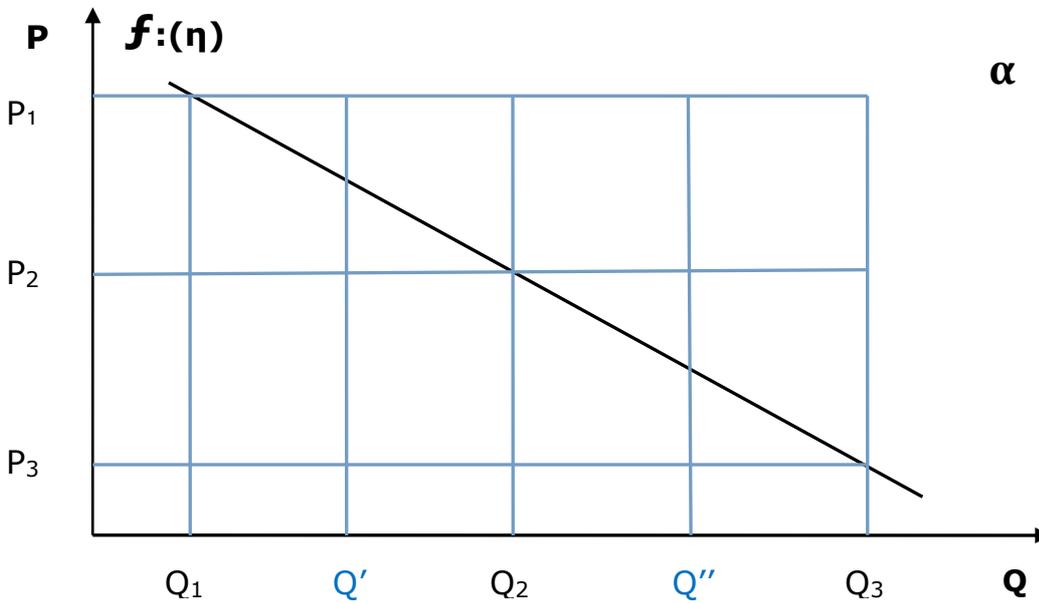
On the 2-dimensional space above where **η** is the expected elasticity of demand of the Commodity **α,** under the price elasticity of demand curve we found the points:

$$(P_2 , Q_1) ; (P_3 , Q_1) ; (P_3 , Q_2)$$

and above:

$$(P_1 , Q_2) ; (P_1 , Q_3) ; (P_2 , Q_3)$$

The expected ones stand for:

$$(P_1 , Q_1) ; (P_2 , Q_2) ; (P_3 , Q_3)$$

And the non-expected are:

$$(Q' , P_1) ; (Q', P_2) ; (Q', P_3)$$
$$(Q'', P_1) ; (Q'', P_2) ; (Q'', P_3)$$

Making an allowance for examining only if the points cited are under or above the expected results for the elasticity of demand equation, no matter how fare or close, because it does not affect conclusions about it, just show how strong or weak is the effect evaluated.

With the representation above is possible to draw 2 different set-ups but having in common a very strong hint that there are hidden forces acting in market, characterizing a failure which would consent State interference.

The 1st set up: when prices (P) rises ($P_2 \blacktriangleright P_1$), the new quantity demanded should retort going to Q_1; however, when Quantity moves to Q' instead, new equilibrium market is driven to the point: (P_1 , Q'), thus **η** become more elastic, producing a functional adjust and also an arithmetical outcome in Q (Real – Expected) which will be always a positive result (Δ^+) when considered that:($\Delta = Q' - Q_1$)

This positive arithmetic effect indicates that the force which prevents quantity to move from original position to Q_1 is of oligopsonistic type, indicating that quantity is bigger than expected because buyers control the demand. This situation is only possible in monopsony, duopsony or oligopsony situations.

In the other hand, the 2nd set up shows us that when P plunges from original state to lower level ($P_2 \blacktriangleright P_3$) market should react heighten Q ($Q_2 \blacktriangleright Q_3$), though, on the same reasoning aforesaid but diametrically opposed, when Quantity moves to Q'' instead, new equilibrium market is driven to the point: (P_3 , Q''), thus **η** become more inelastic, producing a functional adjust and also an arithmetical outcome in Q (Real – Expected) which will be always a negative outcome: ($\Delta = Q'' – Q_3$)

This negative arithmetic effect indicates that the force which prevents quantity to move from original position to Q_3 is of oligopolistic type, because the Q is smaller than expected, because suppliers produce less predictable for that decline of incentive, forcing the adjustment in P for up.

A study of Encinas Ferrer (2010) emphasizes that[note 2.3.1]:

"*Es importante aclarar que la mayor elasticidad de la demanda no se traduce en beneficios para el consumidor final sino únicamente para el intermediario. (…) cuando el intermediario actúa como monopolista u oligopolista resulta interesante observar que si el monopolio al infra abastecer al mercado hace que su oferta sea más inelástica, el monopsonio hace su demanda más elástica, obteniendo en ambos casos un mayor poder de mercado. La doble personalidad del intermediario monopsonista-monopolista tiene, por lo tanto, un doble impacto negativo sobre el mercado, por un lado reduce la demanda a productores que enfrentan un mercado competitivo, logrando con ellos precios más bajos como compradores, y por el otro lado reducen su oferta elevando los precios como vendedores. De esta manera, sus beneficios se ven incrementados al comprar barato y vender caro, afectando la demanda efectiva del consumidor final y la oferta efectiva del productor inicial.[30]*".

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[30] FERRER, Carlos Encinas: *Monopsonio-Monopolio, La Perfecta Competencia Imperfecta.* Tecsistecatl, vol. 2, n. 9. DF, Mexico. (2010)

The conclusion possible from this consideration is that in presence of oligopsonistic or oligopolistic market failure there is an ampler rigidity of quantity produced. The economical logic behind the mathematics which explains these 2 effects is that, in the first case, oligopolistic situation, the Q is bigger than expected because there is no substitution effect for suppliers, which is a characteristic of oligopoly: when prices rise, quantity may not falls as expected because of the lack of options making the prices more elastic. It is the sense but with inverse signals. In the second state the control of the market buy suppliers can reduce production enforcing prices to rise.

Often prices appear to be relatively stable in oligopsonistic markets, and it is even sold as a fine consequence of these market failures; however the real price stability is caused by middlemen price control for, not beneficiating the final consumer. There are different models to explain periods of price stability in oligopolistic / oligopsonistic markets.

2.6 – Kinked Demand on Oligopsonistic Scenery:

Although price stability is seen by some politicians as the main goal in economic policy[note2.4.1], and some Marxist Economists went even further, preaching price rigidity imposed by State Law as a solution for capitalism problems; Economic History has proved that, despite the good will of those who support those measures, these theories are wrong with terrible consequences when applied in markets.

Price stability can be, indeed, a goal for police makers and Central Banks, such as full employment or reducing taxation, and it has, indeed, a positive effect regarding to investments and consumption planning, but other than the aim is how to pursue it and what sort of stability state agents are chasing.

If price stability is a result of a law imposition, it will not last long and, as aforementioned, consequences are worse price variations; moreover, it is important to state that in non-competitive markets, for instance, caused by the lack of concurrence in oligopolistic and oligopsonistic structures of market, prices tend to be stabler when compared with competitive ones, although in a much higher standard; so, it cannot be considered positive from the consumer perspective. It is necessary to evaluate which sort of stability and how it will be achieved in order to give a scientific based conclusion.

There are different models to explain Price Elasticity in non-competitive markets; the

unsurpassed one as far as this researcher concerned is the Kinked demand curve model.

This theory comes up with a new approach for price elasticity in oligopsonistic environment. The Kinked demand curve suggests that firms have little incentive to increase or decrease prices and tough costs to the cartels if they do so. If a firm increases price, they become uncompetitive and see a massive fall in sells as a result of an inelastic demand for a higher price in this makeup of competition; . In other words: increasing price would lead to a drastic prolapsed in profits, caused by a sharp fall in demand, therefore demand is price elastic for a higher price. This means increasing price would lead to a fall in revenue. However, if firm decreases price, they would gain market share. It is assumed in this situation other firms don't want to lose market share and so therefore they cut prices too. Therefore, for a price cut, demand is price inelastic, because every firm is cutting prices.

In the other hand, if a company decreases its price level, according to classic economic theory, and assuming that the others leave their prices constant, then we can expect quite a large substitution effect making demand price perfect elastic towards deserter firm. Moreover it would expand its market share far beyond of its production capacity because all the consumers would come to buy/consume its commodities/service caused by a perfect elastic price of demand; so this out-of-the-cartel firm has to make a huge investment in order to be able to provide for the whole market when it reduces its price level; nevertheless, assuming the logical behavior in economics, competitors will not simply give up their market slice, therefore, on this very moment there will be 2, maybe 3, sturdy consequences for the deserter company which are:

1st: it is vanished from cartel and its benefits[31];

2nd: competitors will cut prices as well because of the price inelasticity of demand;

3rd: If the deserter company has no dominant position, it may be target of Dumping practices from the competitors because they assumed that this company is no longer a trust reliable and they measure costs to take the deserter out of the market.

Kinked Demand Curve Model of Oligopoly also assumes that a breakaway company might face a diverse demand curve for its product based on likely reactions of other firms to a change in its price. The common assumption is that firms in an oligopoly are looking to protect and maintain their market share and that rival firms are unlikely to match another's price increase because de inelasticity price of demand, but they will, for the same reason, match a price fall, but, within an oligopoly, they can react asymmetrically

This assumption is based on the fact that: the price (P_1) of the deserter company change

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[31] *From cartel members' perspective only.*

is smaller and demand would be inelastic within the cut section, the competitor new price (P_2) is slightly bigger, so there is no motivation to cut prices even further the necessary when price demand is inelastic and leads to a fall in revenue with little or no effect on market share. Therefore, competitor can regain their market share with minimum price reduction, causing even more prejudices for the deserter firm and making their profits bigger during the price war.

The kinked demand curve model makes a prediction that a business might reach a stable profit-maximizing equilibrium at price (P_2) and output will be always Q_1.

As saw, this attitude will start a price war, where they do not gain market share, as long as the trend is to readjust to the original shares, but with a lower new price level with low profits in the new situation, and, depending how fast market readjust itself to the old configuration, the gains during the gap would not even pay the investments to attend the transitory increase in demand for the deserter company.

Mathematically, this behaviour can be explained with the regular assumption that **P = f(Q)** firm's demand curve corresponding to the "match-price strategy" of the cartel participants and so, we have: **P = g(Q)** is the demand curve corresponding to an "ignore-price strategy", in other words a non cartelized structure. Both demand curves are, of course, down-sloping, however **f(Q)** is steeper than **g(Q)**. because: **|f '(Q)| > |g'(Q)|**

That is the proposal of a Cartel. The kinked-demand curve model assumes that there is no rigidity in prices but a combined strategy by the rival firms in an oligopoly which rivals will match, in a short term a price whether it decreases or price increases in shallow waves which prevent regulators to recognize the cartel.

If cartel participants follow such a strategy, then the demand curve of each trust will have a <u>kink</u> in it at the going price. That demand is given by **P = f(Q)** for prices below the going price, by **P = g(Q)** for prices above the going price, which means that in the cut section companies request to consider increasing output, forcing a price decrease along the cut section demand curve, **P = f(Q)**. Revenue (R) along this demand curve is **R(Q) = Q.f(Q)** and marginal revenue (MR) is:

$$\textbf{R'(Q) = f(Q) + Qf '(Q) = P(1 - 1/E_1)}$$

whereas (E_1) is the elasticity of demand on the demand curve

$$\textbf{P = f(Q)}.$$

Company's revenue after a price increase follows demand curve **g(Q)**, which means that its revenue is: **R(Q) = Qg(Q)** and marginal revenue is: **R'(Q) = g(Q) + Qg'(Q) = P(1 - 1/E_2)**

where (E_2) is the elasticity of demand on the demand curve **P = g(Q)**. Elasticity of demand is **Q.P / dP.dQ**, then: **E_1 = Q.P.f(Q)** and **E2 = Q.P g(Q)**.

Since $|f'(Q)| > |g'(Q)|$ by assumption, $E_1 < E_2$. Therefore substituting these functions into the corresponding relationships for marginal revenue and evaluating at the going price, $MR_1 = P(1 - 1/E_1)$ must be less than $P(1 - 1/E_2) = MR_2$. The conclusion is that the firm's marginal revenue for a price decrease is less than the marginal revenue for a price increase; the marginal revenue function must have a "gap" at the going price and quantity in the cut section where mobility in P does not means a proportional (per elasticity price of demand) change in Q, which is a strong evidence of Cartel manipulation.

The Kinked Demand theory is graphically represented such as followed:

Graph 6 - Kinked Demand Curve in Oligopsony:
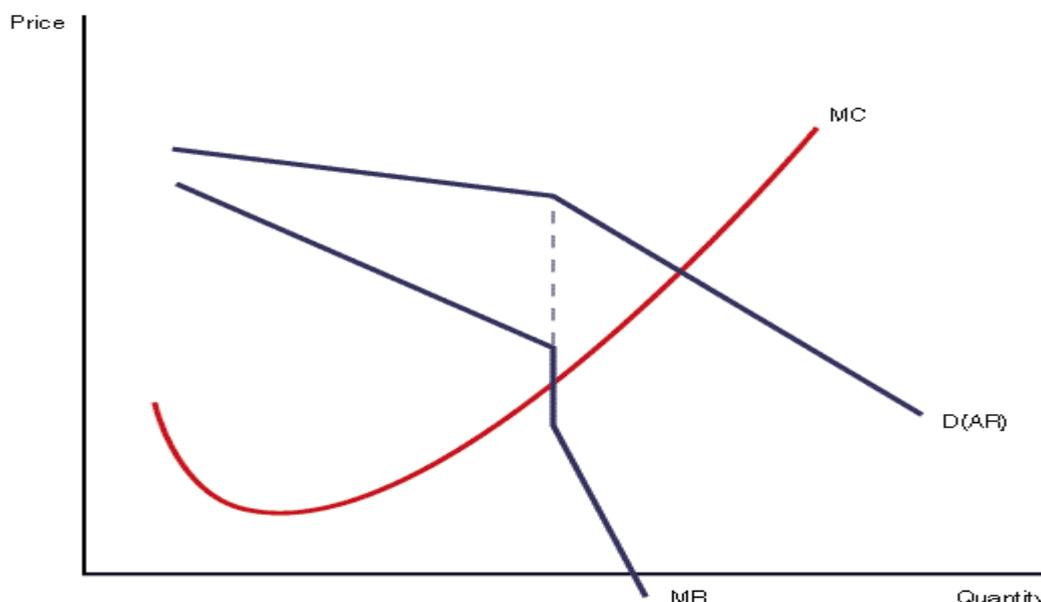
The marginal revenue curve (MR) is discontinuous and have a vertical section, supposing the demand (D) is equal to average revenue (AR), so the marginal cost curve (MC) can move anywhere along this section and there will be no change in output of quantity as showed and in the equilibrium price, because demand is price inelastic as aforementioned.

In case of an oligopolistic structure, the pressure will be to stabilize prices on the top of the vertical section, however, when the market analysed presents oligopsonistic characteristics, the straining will be to lead prices to the ground of it. In free competition markets this graphic is not applicable. Another graphic will be showed in the section 3.1 where the situation of imperfect competition is analyzed through the focus of firms' profit; between these 2 models is possible to take a compelling conclusion about the existence of oligopolistic or oligopsonistic activities in the analyzed market.

Moreover, the kinked demand curve can also be seen as a limited form of game theory, since it assumes firms will not cut prices because they do not know how other firms will react. In the real world, indeed, it explains why firms wait to see how other firms react. Firms do not want to be

the first to change prices. If one of them raises the price, then it will lose market share to the others. If it lowers its price, then the other firms will match the lower price, causing all the firms to earn less profit and breaking the trust bond among them.

Critics of the kinked-demand model point out 2 friable topics in the theory, for them, the model explains why oligopolies maintain pricing, but it does not explain how its products were initially priced; the 2nd critic is that the model does not explain what happens when the economy changes significantly. Those reviews are pertinent but to this research, which is study oligopsonistic models they are not relevant, the most important in Kinked Model was to demonstrate that in an oligopoly change prices often engage in a war, where each firm loses more than in free competition situation, stimulating even more the price stability.

Therefore, the kinked demand curve model suggests that prices will be stable, inside a gap, in presence of cartels or trust arrangements but higher[32] than in a free competition environment. Empirical evidences to support this model are strong whether different markets analyzed, whether along distinct periods of time. Prices change in Oligopolistic markets, especially to deceive governmental regulators, but always in a small gap than expected and constantly over the market equilibrium price. When market regulators surveillance is not effective, so it is not necessary make combined price waves, oligopolies act like a pure monopoly.

So, as the kinked demand curve model predicts, this price war in Oligopolistic situation has absolutely no economic rational stimulus[note2.4.2], which leads prices under a cartelized market to a relative stability, although always over price equilibrium market, with businesses focusing on non-price competition as a means of reinforcing their market position and increasing their supernormal profits.

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[32] Or lower in case of oligopsonistic markets perspective.

Chapter III – Exogenous Outcomes of Oligopsonistic Cartels:

3.1 – Substitution Effect Outliers in Non-Competitive Markets:

Substitution effect is the guarantee of the free market for consumers. When a few numbers of producers try to manipulate market price, in the case that there are other equal options, consumers move forward to substitute goods in a normal and justifiable decision. It is possible to assume that the consumer's power of choice stands on the Substitutions Effect and Cartels are exactly the opposite of it, they restrict consumers' power. In an oligopsonistic cartel the goal is not different, just the polarity is inverted: middlemen play the role of the producers in traditional cartels.

Reducing theoretical restrictions to understand the real stimulus for Cartels in Oligopsonistic settings, and thus to be able to detect and prevent them, analysis of Substitution Effect over markets can reveal the existence of hidden forces preventing free competition and so jeopardizing consumers' or suppliers' freedom of choice. Microeconomic literature shows that monitoring the ratio between prices of substitute goods or services and relating them with what would be the rational decision of consumers' and suppliers' is an important feedback which indicates market failure, and oligopsonistic cartels are especially sensitive to that.

Another important point for oligopsonistic cartel analysis is to be certain that goods are substitutes; otherwise the whole research and conclusions can be failed for a mistake in the parameters. To classify if two or more goods are substitutes, it is necessary to check up on the relationship of the demand schedules when the price of one good changes.

The goods which consumers switch over to following a price augment are the substitute goods. The demand for substitute goods increases as the competing goods' price increases; this characteristic draw a line between Substitute and Complementary goods. This relationship between demand schedules leads to classification of goods as either substitutes or complements. Substitute goods are goods which, as a result of changed conditions, may replace each other in use. A substitute good, in contrast to a complementary good, is a good with a positive cross elasticity of demand. This means a good's demand is increased when the price of another good is increased. Conversely, the demand for a good is decreased when the price of another good is decreased. If goods A and B are substitutes, an increase in the price of A will result in a leftward movement along the demand curve of A and cause the demand curve for B to shift out. A decrease in the price of A will result in a

rightward movement along the demand curve of A and cause the demand curve for B to shift in. So we can assume that Substitute goods are two or more equals or similar commodities that could be used for same propose; if so, when the price of one good increases, then demand for the substitute tends to rise as well, therefore, substitutes have a positive cross elasticity of demand.

Moreover, substitute goods admit levels of similarity which imply in the outcome of the impact of the one good can have in another when it rises or decrease prices. In Close Substitute Goods, there will be a high cross elasticity of demand, however, in Weak Substitute Goods there will be a low cross elasticity of demand. They can also be Perfect Substitutes if the utility imagined that consumers get from one good is the same as another. In this case, cross elasticity is not positive, but substitutive, seen that, in theory, if one good is more expensive, there would be no demand for it as consumers would buy the cheaper alternative.

As far and widely known, in the general theory of Economics, price and demand are inversely related, when price of a service or good decreases, consumers tend to buy or consume more of it, and vice versa. Of course, this general rule can be applied for microeconomics consumer choice theory with some exceptions as the Giffen Theory. The substitution effect is a development of this general theory and it can be defined as a relation between the price of a commodity or service over the quantity demanded by consumers, excluded the income effect, and the change in relative prices of the two or more commodities[33]. In Price Elasticity, analysed on the previous chapter, price of a good and its demand is studied isolated; substitution effect however allows the observer to experience relative prices among the goods or services analysed and it is essential for the proposal of this thesis.

The power of choice and exchange (or not) from one bundle of consumption to another for price's reasons is not only usual but logical economic behaviour, it is the purely expression of consumers' freedom of choice searching for the optimal alternative on their budget line, this is called on the Hayek's words: The Economic Power″, the base of the whole capitalism system, which Rothbard define as:

> *"Economic power, then, is simply the right under freedom to refuse to make an exchange. Every man has this power. Every man has the same right to make a preferred exchange. (…) there is only one form of illegal coercion — overt physical violence — it is the refusal of the right to exchange."[34]*

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[33] Although is possible to work with 3 or more commodities, for the proposal of this thesis, we are going to use the 2-commodity-effect only. The gain in complexity does not mean necessarily an increase in accuracy when oligopsonistic markets are analysed.

[34] ROTHBARD Murray N.: *Power and Market.* Sheed Andrews and McMeel, p. 228. Kansas City, USA. (1977)

Oligopsonistic cartels are based exactly on this lack of freedom of choice of the middlemen whose suppliers will sell their goods. The inexistence of this "Economic Power" is very sensitive when examined through Substitution Effect lens, which makes this failure of market very visible and it will be analysed under the theories of the 2 remarkable Economists: Slutsky, who already helped this study on the chapter 2.4, and Hicks, one of the most influential authors studied for organize the conclusions of this thesis. They will be better explained in the next chapters.

In competitive markets, the Substitution Effect is structured on the simple suggestion that as price rises, consumers will replace more expensive items with cheaper similar alternatives, or when prices fall, more consumers will leave their original choice of buying to become new consumers of the producer which decreased their products' price level; in any case assuming always that income remains equal. As the level of a price increases for a service or good which are fungible, consumers tend to change towards a relatively lower price substitute to optimize their budget; which is a regular and expected consumers' decision. The consumers' continual search for substitutes with better prices stimulates competition among suppliers and this balance, between these 2 divergent forces, frames the whole free market system of the capitalism.

Graphically, Substitute goods can be explained comparing 2 graphics or using the same 2 dimensions space. For the 1st option, graphics 10 and 11 ahead describes Substitute Goods using comparison:

Graph 7 and 8 - Substitution Effect :[35]
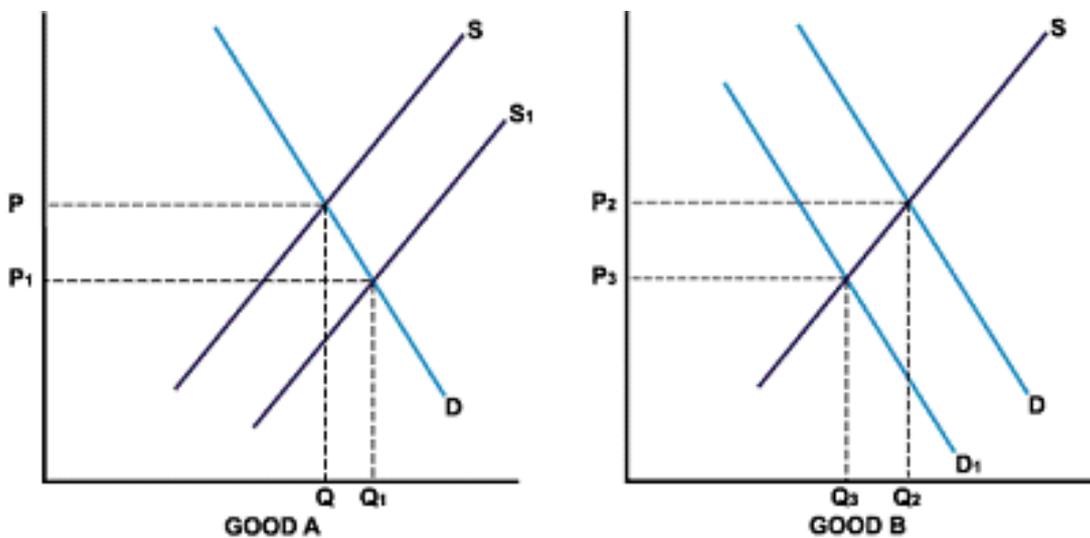
The rise from P_1 to P makes Q_1 move to Q generating a new S with a fresh equilibrium point for the good A; as a consequence, on the 2nd graphic it is possible to see that the new S makes

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[35] https://apecon2.wikispaces.com/Substitute%20Goods

price go from P_3 to P_2 and D is bigger than D_1; thus, this totally irrational movement[36] in demand is explained by the good B being a substitute of good A which experienced a price markup. In oligopsonistic markets the same reasoning can be done, but with 2 shifts:

      a) It is necessary to replace the concept of "goods" for "middlemen";

      b) Instead of rising prices, middlemen reduce their offer, forcing prices down;

With these 2 changes, the same theoretical framework can be used to explain the movements in price and behaviour of the agents in both phenomena, since the logic behind the stimulus is the same but in the opposite direction.

This use of Substitute Good theorem can provide 2 likely outcomes which deserve to be watched out for:

I - When suppliers do not move their sales to another middleman who is paying a better (higher) price;

II - When middlemen do not equalize his/her concurrent lower price level;

These are clear signals of oligopsonistic action in the market analyzed. The expected tendencies for the cases aforementioned are:

1st – Suppliers move their sales to the middleman who is paying the higher price;

2nd - If a wholesaler raises or shrinkages its prices, the competitors go in the same trend, just like Substitute Goods theory;

These are not more than follow the general market rule applied for oligopsonistic settings. So, the study of Substitute Goods can provide an important toll to differentiate whether the effects come from a similar phenomenon or it is actually an indicator of a market failure.

The other graphic explanation, more technical and made in only one graphic, comparing changes between 2 goods (X , Y) and different BC(Budge Constraints) in order to isolate substitution effect from the income effect, is the following: *Graph 9 - Substitute effect in oligopsonistic market*[37]

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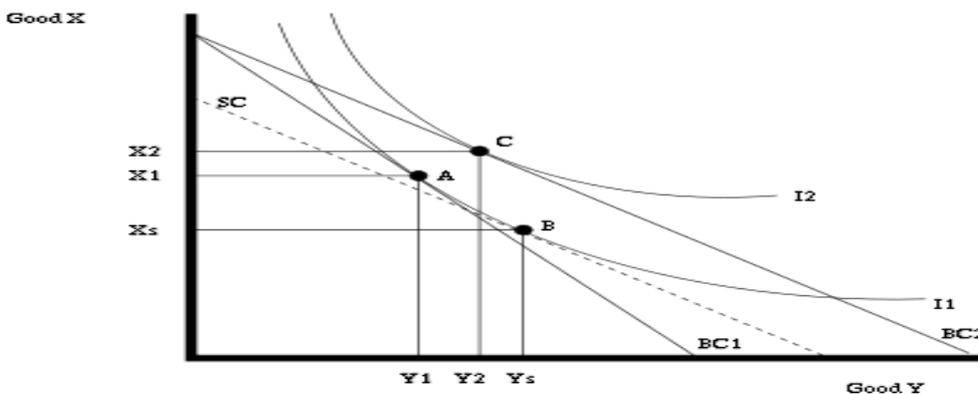
[36] The expected movement when price rises is a decrease in demand.

[37] http://www.ssc.wisc.edu/~gwallace/ECON_101/Homework/hw05a.pdf

Above, the graphic illustrates a situation where there are 2 goods: (X ; Y), 2 different Budget Constraints (BC1 ; BC2) and 2 Indifference Curves (I1 ; I2); it also exhibits the best consumer choosing for the (I1) in the point (A), where (BC1 = I1), which is the Pareto Optimal Efficiency, and the best higher consumer choosing for (I2) in the point (C), where (BC2 = I2). Positions of BC1 and BC2 indicate consumer's income level, the further from the axis, the better. Inclinations, on the other hand, can show 2 effects:

1st. Consumer's preferences, with no value judgement, and,

2nd. Relative prices of the two goods, for this analysis: X and Y.

On this theoretical circumstance showed, the Y price decreases, so BC tends to pivots from BC_1 to BC_2, with a greater intercept of Good Y. With this new state, the outcome is that the consumer Pareto Optimal choosing leaves (A) towards (C). As we can see, the new consumption bundle provides more of the Good X since $(X_2 > X_1)$ and of course more of the Good Y $(Y_2 > Y_1)$.

The move from (A) to (C) can be decomposed into 2 parts. The Substitution Effect so is the change that would occur if the consumer were required to remain on the original indifference curve; this is the move from (A) to (B). The income effect is the simultaneous move from (B) to (C) that occurs because the lower price of one good in fact allows movement to a higher indifference curve.

When these movements are not observed, we have suggestions of oligopsonistic market failure.   In the next section, we will focus in another approach that Substitute Goods theory can contribute for shed light on oligopsonistic phenomenon.

3.2 – Slutsky Diamond Theory applied for Oligopsonistic Cartel:

The major characteristic caused by an oligopsonistic cartel in market is that suppliers do not move to another middleman who pays a better price for their products/commodities; which would be the normal and expected behaviour in these situations. In case there would have not been oligopsonistic forces in action, the offer relocation would be overall in the market sector, since the utility for the lower price would become null, therefore the graphic which explains this circumstances has an abrupt cut just like in the "Kinked Demand Graphic". Under such conditions the middlemen would tend to pay the market price for the suppliers with no space for lower price than that of the Equilibrium market, thus, an inter-temporal graphic analysis of prices chain would

show a sort of "WWW" figure under the bias of the t(time) for abscissa and p(price) for ordinate, or like waves around the market price. Any other figure would be a sign of external interferences in the free market, but, and we have to spotlight this, it does not necessarily mean oligopsonistic cartel action; it also could be an outcome of seasonal effects, marketing campaigns results, state of the art evolution, general increase of the in income level, among many others; subsequently other than those variables, it could be indeed a result of oligopsonistic action, hence distortions in price trends is not a conclusive clue, but a strong indication.

The dilemma to consider the substitution effects in the studies of oligopsonistic markets is how to isolate its results from the Income effect, which produces comparable outcomes in final prices. The Ukrainian / Russian Economist E. Slutsky offered a strapping mathematical theory called Slutsky Diamond that possibilities detach the Substitution effect from the Income effect in a changing of final quantity of demand in goods or services. Per Slutsky Equation, the level of utility (U) that a person gets when chooses the best consumption bundle, given prices "P" and income "Y", then follows that: U = (p, y).

Precisely because of the many reasons that can cause those deformations on f(p), Slutsky decomposition is essential to better understand what accrues from the design of the graphic, giving us strapping information about the class of strength is in action on the market.

Without interferences, apart from offer and demand forces, the price relation between the middlemen and suppliers would draw a graphic in time as follow: *Graph 10 - Free Market Price Variations*
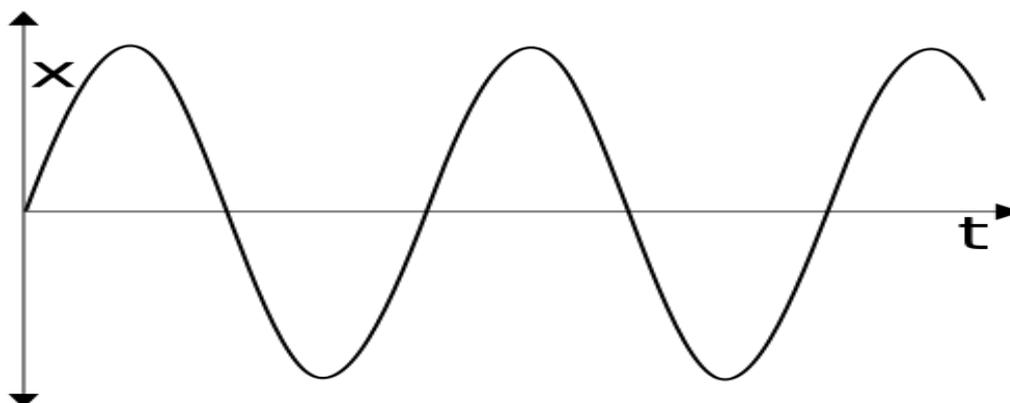
The graphic above offers a perspective throughout time (t) of price (P) variations in ordinary conditions. Slutsky, however, suggests a decomposition using coefficient of price variation of the marginal rate of substitution. According to the Economist, the best measure to know if a good is essential or not is analyse where the indifference curve shows there is no more consumption of the good. As it happens, this definition hinges on whether preference of consumers is greater than, smaller than or equal to 1. This approach of substitution effects and the Slutsky decomposition also identifies whether goods are essential or complementary. This background allows us to better

understand one of the most enduring puzzles in oligopsonistic cartels: Why, from time to time, middlemen raise prices if they have total control of the market?

Slutsky decomposition also allows us to sort out effects which come from Substitution and Income variations providing a utility foundation for marginal revenue. These foreshadowed outcomes in oligopolistic cartels not easily seen in graphics. Slutsky "diamond" is a particularly opportune to prove that most of utility that consumers give to the products is ambiguous; it is much more psychological rather than real. The Essential or inessential nature of goods are based in suppositions, not in facts. His findings match up agreeably for oligopsonistic markets, because there middleman have nothing to offer for suppliers but money; the unconscious system of perceptions and beliefs among consumers, which make a product being classified as complementary or essential, is applied into the 2nd relation, which is middleman/consumer, but transferred for the price paid in the 1st relation, therefore Slutsky decomposition, through comparative statics, common utility functions and outlines provides an explanation for the asymmetry between a need and a want and their effects on oligopsonistic markets.

A test based on indifference curves explains that 2 goods: (X ; Y), if indifference curves are bound away from the X axis or asymptotically move toward the X axis then Y is essential because some arbitrarily diminutive quantity of Y is necessary for positive utility. The critical fact is that the indifference curves must bend just enough to approach them, but not cut the axis. If they bend more slowly, then the curves cut the axis and the good is inessential. Analyze indifference curves in terms of the marginal rate of substitution allow us to better define utility of any good and it utility compared to the substitutes. According to his theory, comparing 2 goods X_1 and X_2, so:

$$U = U(x_1 , x_2) \quad and$$
$$U'_i = (\partial U / \partial X_i)$$

Therefore, the slope of an indifference curve for marginal rate of substitution is the negative, because:

$$f = u'_1 / u'_2 = - \partial x_2 / \partial x_1$$

The first thing, in the graphic 13, that draw viewers' attention is the centre of the curves and the distance among them, however what Slutsky lets us to understand is how indifference curves behave near their lower bound. The behaviour of the marginal rate of substitution as *X* is increased or decreased in different BC's. Slustky suggests that as (*f*) changes, moving across indifference curves and not along a single indifference curve, it is possible to verify the real necessity among goods analysed. Moving across indifference curves it is expected a (*f*) change from the extreme value of the relevant axis to somewhat more rational until consumer gets totally indifferent, as a result, when X_1 increases, the slope changes from nearly infinite to something more reasonable, because:

$$\partial(f) \,/\, \partial X_1 < 0 \qquad \text{and} \qquad \partial(f) \,/\, \partial X_2 > 0$$

For that reason, increasing the price of good X_1 turn around the budget line and changes the equilibrium values between the goods analysed. Moving to the left along the curve, the slope of the indifference curve changes faster than the change in the angle of the budget line. This entails that the indifference curve becomes vertical at some point before the budget line does and therefore the indifference curve never intersects the axis indicating the good is a necessity. Moreover, this behaviour also implies that demand for X_2 weakens as P_1 rises and X_2 is a gross complement of X_1.

In the case shown in the Graphic above, indifference curve bend less implying demand for Good A rises as (p) of Good B rises and the indifference curves will ultimately cut the axis indicating that Good A is inessential and that Good B is a gross substitute. If preferences are elastic, so ($\partial >$) the indifference curve bends more, Good B is a gross complement and Good A is essential. Non-homothetic utility functions are analysed in the same method, the only difference is that we need to rotate the budget line toward each axis independently in order to evaluate Good A and Good B separately.

Our goal is to understand how the substitution effect may be employed in comparative static analysis within oligopsonistic entourage, therefore we focus on the general case where all income is spent, all consumption levels are strictly positive and indifference curves are well-behaved, so that we can make a theoretical parallel for oligopsonistic markets, the indifference curves of the suppliers, in the same trend as substitution effect between X_1 and X_2, should change slope relatively slowly and therefore intersect the axes where prices paid for one middleman draw with the concurrence plus logistics, where the indifference curve becomes parallel to the axis as the axis is approached.

Although Slutsky theory of substitution effect is not symmetric and at first sight it appears not to let any comparative analysis, his equation clearly allows simplification and interpretation beyond substitution effect and a deeper examination of its fundamentals is equally revealing, precisely because the Economist distinguished a lot the concept of local and global, which, together with price, is a definitive factor for the suppliers' decision to whom they will sell their products.

Per Slutsky theory, in general conditions goods might be separated into 3 categories[38]:

a)   Local and Inessential : $\partial_i{}^{\prime} < 1$

b)   Local and Essential : $\partial_I{}^{\prime} = 1$

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[38] Slutsky considered that a commodity which is no longer "Local" might be "Essential", thus he did not consider the hypothetical 4th category.

   c)   Not Local and Essential: ∂_I' > 1[39]

The "b" case is where the change in the slope of the indifference curve precisely matches the alteration in the slope of the budget line, as it does for unitary elastic preferences, and then there is no modification in the demand curve. This is the boundary situation between essential and inessential goods because the budget line and indifference curve become vertical in concert. In Oligopsonistic markets, it can be visualized when the price paid for a commodity is equal the others middlemen offer plus logistic costs where suppliers become perfectly indifferent.

Those Slutsky decompositions depends on an income-compensated substitution effect summing another sheet of complexity, which do not add accuracy to this analyses. The impact of income levels change in Oligopsonistic Markets is null, therefore it is absolutely no point in scrutinizing it here.

3.3 – Oligopsonistic Pareto-Optimal Price:

In a dynamic market when intermediate's profit maximization is not possible to be upheld as a cartel outcome, the second-best equilibrium for middlemen suggests that the closest price from the minor lower profit that would have been possible in monopsonistic settings is the alternative goal to be pursued. This occurs for the simple reason that this price is always higher than competitive one although inferior if compared with those achieved in cartelized markets.

Maximize the middlemen's profit with less effort is the main reason why oligopsonistic cartels are built, and this is the aim to be pursued for intermediates when Market Authorities(MA) are not vigilant enough. It is what is called Pareto-Optimal Cartel Price in Oligopsonistic situation: the price which maximize profits with less effort and risk. It carries relevant acquaintance to understand the structure of the competition that market is undergoing. Besides, it is necessary to consider a standard dynamic market involving substitute products to arrive to precise conclusions based on comparative measurements.

Oligopsonistic agents will collude as long as it is profitable for them to do so, and since these collusions are illegal in legislations throughout the world, they only do it when they are safe and profitable enough to compensate the risk involved[note3.3.1]. It is also important to add that empirical studies show that the number of intermediates in any market is always smaller than

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[39] The 3 indifference curves are derived from a Cobb-Douglas utility function.

consumers and highly frequent is smaller than producers. These 2 characteristics summed up make the oligopsonistic cartels more steady and tight than other sorts of arrangements.

However, if the aggregate maximizing outcome is only sustainable in short term as an equilibrium behaviour then the Oligopsonistic Pareto-Optimal Price(OPOP) may involve lowering the price below a hypothetical monopsonistic level to maintain for longer the cartel agreements.

Under a set of standard forms of competition where products are not perfect substitutes cartels are slightly different from the ones framed for fungible goods, so OPOP prices can show distinct outcomes according to the sort of market they show up. Oligopsonistic price for consumer is above competitive price and below it to producers. In both uttermost prices, might be analysed separately as each one has its own competitive price equilibrium.

When middlemen put prices down for producers, the theoretical positive externality of a better price for final consumers ends up internalized on the process, and it does not arrive to them. This new price of buying only increases profits of oligopsonistic cartel members, it does not generate superior welfare for consumers or better competition[note3.3.2].

As a normal reaction to middlemen new policy, producers will reduce sale quantities, the interaction of these 2 activities will result in less production and, in consequence, it will lead to market shortages. The ultimate outcomes are that prices will raise and middlemen will have a temporary double win, since quantities are strategic complements for prices in the 2 extremes of their activity. This transitory situation can be called Pareto-Optimal Oligopsonistic Cartel Price, where intermediate firms maximize their profits in both uttermost. This situation however is only sustainable in short / medium term.

For medium / long term cartel arrangements, it is necessary to consider a setting slightly different and another strategy. It is pivotal to consider a dynamic market potentially collusive with complementary goods or services and imposition of the existence of middlemen, preventing the direct negotiation between consumers and producers; with this scenario Pareto-optimal oligopsonistic cartel price can be achieved and sustained in medium and long terms if firms act increasing price or lowering quantity until monopsonistic levels. If this intent is fulfilled, the gain from deviation is decreased under the collusion levels; it would be a situation less stable than a monopsonistic but still better than to competition, although with opposite welfare consequences. Considering a 2 intermediate firms' stance, which means a duopsonistic market, the only theoretical contrast with the scenario aforementioned is that the quasi-monopsonistic setting would be more stable.

In another hypothesis where 2 products are perfect substitutes on both sides, in a dynamic market under certain conditions: perishable products, no brand influence, no personal

relations between sellers and buyers; intermediates will behave as selling complements and some sort of complementarity in demand prevails, while with real complement products oligopsonistic collusion is two-sided markets and it has distributional consequences: Oligopsonistic cartel can end up decreasing aggregate sales if oligopsonistic agents do not fully control both markets, so despite of Pareto-Optimal cartel prices illegal agreements are harder to sustain under unfeigned complementary products or services therefore incentives to deviate from the cartels actions increases. When level of prices in collusion is almost compatible with price under competition situation, oligopsonistic cartels are not sustainable in medium / long terms because the risk is not paid and there will not be regal perspectives of growing in business for the agents except if market grows. Thus, in this alternative situation, there is no OPOP and oligopsonistic collusions is only stable if agents control both complementary goods or services.

Others market failures can also influence OPOP, such as consumers' imperfect information; prices are exogenously set by law, agencies or any other form of State interference; producers can extract the full surplus, which means they have monopoly power; quantities of strategic complements are controlled by suppliers generating incomplete markets; on these circumstances, firms will end up competing. It will lead to higher quantities and lower prices. Similarly, to a one-sided market, when collusion maximization is not feasible, OPOP becomes an intermediary point between oligopsonistic and competitive price, moving from perfect competition towards monopsonistic level if aggregate demand is elastic.

Overall consumers and producers' welfare will decline when moving from perfect competition towards OPOP and middlemen is the only one to increase welfare by bigger profits, however, so that it is sustainable endogenously in medium / long term, production quantities might decrease for a while, playing a similar role to monopsonistic cartel.

As a simple model, we can assume that the stimulus for competing with substitute products is almost null and when it comes to complement products it is small. In both cases, quantities will play strategic roles since dilation ratio between price of buying from producers and price of selling to final consumers is more relevant than whatever expansion of the uttermost not followed by the other extreme. Summing up, to reach a conclusion about OPOP is needful to visualize oligopsonistic agents act inside of the chain production, which makes the labour of MA more difficult; their conspiracy is not measurable by easily seen price tags, but instead it is disguised in internal countability. For oligopsonistic cartels the endogenous vertical gap product differentiation is more important than horizontal changes within whatever side. When moving from free competition to an oligopsonistic setting, diversion ratio is what makes their profit increasing and if it is bigger than the diversion ratio in final price changes, it is enough to stimulate collusion, especially

because without an impactful change in final prices risks of Market Authorities' trials are reduced.

Graphically it can be conceived by setting parameters on both sides, considering general conditions with market prices for substitute and complement products where quantities are strategic complements and revenues derived only from non-linear demand quantities:

Substitution effect enables economists to verify through a positive cross price elasticity of demand between 2 or more goods or services the competitiveness in a specific market or industry. The substitution effect between 2 goods can be equally proportional, more than proportional or less than proportional; whatever type of positive correlation found does not affect conclusions about substitution effects. The simply idea sustaining the theory is that consumers tend to buy more of the substitute good when price of the paradigm rises and less when it falls. How much more is only relevant for microeconomics analysis for a specific enterprise, for macroeconomics proposes, the simple fact that 2 or more goods or services are positively related in cross price elasticity is enough to draw a picture of the inside relations in a market or industry. Trend is more important than significant the quantities on this overture. Outliers in this tendency can show exogenous interference on the market.

Although in most of cases beheld producers of the goods or services are in the same industry or market, it is not a non-exceptional rule. It is not possible to assume that substitution effect only applies to goods and services within an industry or market; it may also be applied to very different services and goods and unlike industries and markets: for instance: bicycles and gasoline are not at the same trade shelf, in fact, they are antagonists, they belong to different industries and, notwithstanding, a rise in the price of gasoline raises demand for bicycles, increasing, by consequence, its price.

The interaction between these 2 events has a normal and expected outcome when market is under free concurrence situation. When, however, the interaction of these occurrences does not match with the predictable upshot and the outcomes are unexpected, it can indicate that exogenous interference or some hidden forces are acting on the free market.

Defining Substitution condition in quantitative methods, Integrals Chain Rule is the best tool to show the relation between 2 or among several functions across one variable: price (P); to exemplify it, we use only 2 functions (f) and (g), where: *Eq. 15 - Integral Chain Rule:*

$$\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$$

With this basic tool is possible to analysis how much function *(f)* will diverge when function *(g)* changes, and, thence which are expected outcomes and which are outliers.

Other variables can also affect demand curve of a specific product or service because they are subject to extrinsic pressures which leads to changes in the final price, such as complementary prices of goods or the income effect, to give just 2 examples, but this formula has the capacity of filter that, showing the pure impact of *(g)* into *(f)* or vice-versa.

In the same purport, price fluctuations inside a supply chain, from the original producer until the final consumer, passing through the middlemen has a discreet outcome in market prices, but not the real fluctuations inside the chain, because, the ups on price are immediately transferred to final prices, but the downs are, for a while, absorbed for the brokers as profit increase until it is not possible for concurrence pressures.

It is possible to notice this immediacy of transferring highs in price and delays in downs especially in rates markets, where the price of the basic interested is clear, numerical and equal to all intermediate borrowers as well as grocery and farmer products, very susceptible to highs and lows in demand and supply market forces due its perishable. This delay in low price transferences to final consumer is one of the clues that the market is under oligopsonistic pressure.

These unforeseen situations lead prices to rise in medium and long term, which is one of the main oligopsonistic markets characteristics, but not the only one. The lack of options for producers to sell their products can direct industries to insolvency and bankruptcy. Moreover, thresholds preventing new entrepreneurs or intermediates to get into the market are also remarkable consequences of oligopsonistic arrangements, and furthermore, the shortage of competitiveness leads to a scenario of lower quality products or services.

In Oligopsonistic markets the control of prices by few intermediate companies can straight several producers (companies or individuals) to economic failure [40] and thereafter unemployment, less taxes for the Government, prices real inflation apart from the destructive competition, sabotage and corporate corruption.

In both uttermost there are, clearly, inefficiency and losses, and although some sectors, firms or consumers can take a benefit out of this situation for a while, society reaps losses, instability and economic damage.

It is already proved by sediment economics literature that whether there is sufficient demand substitution oligopolies are hardly framed, and when they succeed to be structured it is more conjectural than factual, they have a reduced strength in markets and they are less efficient exercising its price control policy. Oligopoly/Oligopsony and Substitution effect are opposite forces which neutralize each other.

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[40] The market controllers do not drive all of sellers to bankruptcy, there is a maturation policy that will be better visualized in the graphics ahead, but the ups and downs in deed lead many sellers out of the business.

Producers tend to maximize their profits and consumers on the other hand tend to minimize their cost. The outcome of the impact of these 2 behaviours is the equilibrium market price, but when prices insist on be far away from this point it may be an evidence of cartel actions.

Another phenomenon which must be observed is the substitution effect which is a market situation where the rise in price of one service or good begets a proportional ascending in demand for another service or good. When this occurs, those goods or services are called: "substitutes".

This relation is theoretically justified because the rise in price of a good or service, considering incoming constancy, induces consumers to buy a relatively lower-priced equivalent, thus Substitution effect in any market or industry is always perceived an off-putting for the sellers or services providers. For consumers although, is the axis of their freedom of choice seem the rational stimulus to switch from higher-priced into lower-priced goods or services as they attempt to keep their living standard. This behaviour is the starting place for all market theory, and it is not confined only to consumer's conduct, but it is noticeable in other areas as well such as investments, labour market, stock exchange, even some migration flows are studied from this approach, and it is key tool to analyse oligopolistic and oligopsonistic markets.

Per Hicks theory of substitution effect in competitive markets, consumers with just enough income to achieve their old utility level at the new market prices, tend to change their consumption habits to reach a different standard than the old one. These small substitutions, when analysed micro-economically are insignificant, however, when it comes to macroeconomic terms it can lead to a huge impact in the whole market though, and precisely because of that, as stated previously, there was concern that WIC benefits would be used for all of the purchases made when using non-WIC Payments.

Some authors refer to one of these two concepts as simply the substitution effect. The popular textbook by Varian describes the Slutsky variant as the primary one, but also gives a good explanation of the distinction.

The same concepts also apply if the price of one good goes up instead of down, with the substitution effect reflecting the change in relative prices and the income effect reflecting the fact the income has been soaked up into additional spending on the retained units of the now-pricier good. Different situations in its dots; in red, suppliers are selling their commodities for a lower price that they can reach when the outliers are under the $f(S_1)$ and, in blue, consumers are buying for prices over they could normally pay for when outliers are over the $f(D_2)$ (blue dots) whereas the black dots are ordinary exchanges in market with 2 substitute goods. The green dots however describe a feasible situation when, at the same time, market is under oligopolistic and oligopsonistic pressures; as follows in the graphic bellow:
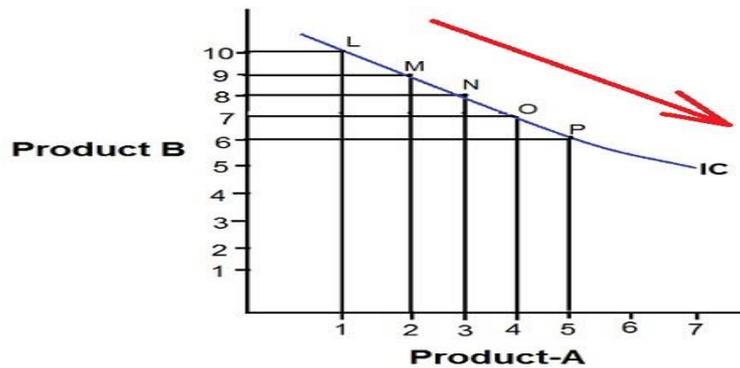
As showed, the substitution effect will encourage consumers to buy an alternative commodity or other product or service close of the one they originally would pay for. The substitution effect measures how much a change in price persuades consumers to change their consumption habits towards another one. These measurements stand for a scenario where incomes are stable. When, however, incomes are rising or decreasing identifying whether a demand change is an outcome of substitution effect or it is due to income changes is particularly complex once both effects are intimately linked. Split them up are vital for this research, because income changes have a minor effect in oligopsonistic cartels whereas substitution effects play a major role on the same situation, thus they will be studied on the same chapter.

3.4 – Oligopsonistic Walras Equilibrium:

Oligopsonistic firms use basically 2 systems to find their Pareto-Optimum P and Q : trial / error and imitation. Trial / error is modelled through an experimentation also called "mutation" parameter, which gives firms estimate probability of success. The second one is boundedly based on observed success of other similar cases that have achieved highest profits. Imitation rule simply specifies copying one of the quantities that led to highest pay-offs in the last time (t) periods. In dynamic markets where symmetric oligopsonistic cartel has linear demand functions, the firms' strategy choices fetch market prices to Walras equilibrium.

Interplay between better response, which means better than previous situation and relative success, which means better than the others, creates a dynamic in which two properties determine the long-run outcomes. The first: property is the one associated to Walras equilibria, reinterpreted as an inter-temporal comparison of own pay-offs. The second: the effects of spite and

market stability. In the case of an oligopsonistic cartel, it is possible to perceive the interaction of these 2 tendencies in any whole interval between 2 outcomes stabilizing the wave of middlemen's profits.

For Industrial Organization proposes, the stability of quantities in Walras equilibrium shows that it plays a role in the long run, limiting the interval of the ups and downs in profits in cyclical behaviour. It happens because in more realistic situations, we would rarely observe quantities outside the interval limited by the Walras quantities. When profits are positively slopped, a very small numbers of firms deviate from equilibrium quantity, and according to Alòs-Ferrer (2003) :

> *"This process keeps raising the market quantity until some firm raises it too much, above the Walrasian one, enjoying a short-lived prosperity which is quickly undermined by other firms switching to much lower quantities. From these lower quantities, the "cycle" can start again."*

Imitation of successful behaviour is a common practice in companies; observation approach in oligopsonistic models is due both to technical and conceptual reasons. Technically, the long-run outcome of the observation process parameter, apart from negligible deviation of the standard pattern, is very positive. Empirical observations show that an inter-temporal subtraction between post- and pre-imitation pay-offs are always positive.

Conceptually, oligopsonistic collusions are extremely complex situations where agents try to use simple and clear rules to make decisions become trustful for the agents involved; showing them real cases that worked properly is a strong conceptual incentive. The overall idea is analogous to that underlying evolutionary models, where agents obtaining higher pay-offs thrive at the expense of others. In oligopsonistic applications, strategies of prices and quantities lead agents straightforward to higher profits but also to expose themselves to major risks. The interaction of these 2 impulses brings prices policy to equilibrium and, per Vega-Redondo (2003) the Nash equilibrium can be quickly discarded in favours of the "Walrasian" one where quantity is such that deviations from it always render a situation where relative pay-offs are smaller for the oligopsonistic firms. The reason is that firms set price equal to or greater than marginal cost because of price control in both uttermost by the middlemen, which implies that, with imitation of other markets, only relative pay-offs which do not expose agents to substantial risks, matter.

It is important to remember that oligopsonistic collusions are illegal and it changes the whole approach about the analyses because maximization of profits must consider the hazard involved. If at on side firms deviating from the Walrasian equilibrium earn higher profits on the other side they expose themselves to greater risks, especially because those firms which do not collude have a strong incentive to denounce the cartel and so enhance profits. So, collusions can also be a

detrimental relative position and the interactions of these 2 stimuli also cooperate to bring markets to a Walrasian equilibrium.

In order to buy the right quantity, as a previous phase, firms will lower profits for a while, but those not taking part of the collusion are left with even lower profits, therefore this previous situation leads to a momentary deficient stance for cartel agents but at the same time it is still a beneficial relative position. The cartel idea is objectionable by all means, and economically thinking, this first step is not a Pareto-Optimal position, but it must be remembered that firms, more than individuals, have long terms strategies, so agents will easily replace a short /medium period of not Pareto-Optimum by a long-term period of higher profits. Firms assume a learning strategy relying on previous outcomes, and it is possible to assume that there is an interaction between the 2 approaches because if the results are forgotten, it is arduous to interpret the experimentation process as trial and error, since an error might only be perceived as such when compared with previous results, because the relevant data is not analysed isolated but as a sequence of profits obtained by a given firm in different (T). Moreover, addition of memory leads to Pareto efficient equilibria, because the worst experiences are crossed out and the best repeated, making gaps in cycles smaller, because even in models based on experimentation or imitation there is still a certain significance to the Walrasian equilibrium, since the inter-temporal comparison of the pay-offs after an unilateral deviation allows the agents to perceive it as an error and correct it by imitation of past strategies, moreover successful strategies, identified through inter-temporal comparisons, are likely to be reinforced, both conducts combined stabilize the whole range of quantities between them.

The succession of mistakes and corrections on oligopsonistic cartels strategies throughout time contributes to give the undulate form in graphics which represent profits functions of middlemen. Oligopsonistic cartels models where rational firms compete in quantities adopting a dynamic process of observation, imitation and experimentation are more stable in long term, but the Walrasian quantity is selected by the technical assumptions and from time to time they can diverge from the demand. These mistakes, although the stability is among X justifications for the wave form of middlemen profit function.

Mathematically speaking, when there are $N \geq 2$ firms providing similar services or producing a uniform goods demand (S) is given by the inverse-demand function. $P : \mathbb{R}$ If all firms have equal Cost (C) function, it is possible to assume this function to be twice-differentiable in a closed interval [0, Qmax], downward-sloping, and Po < 0. Walras quantity = xW so:

Eq. Walrasian Quantity:

$$P(0) = Pmax > 0 \text{ and } P(x) = 0 \text{ for all } x \geq Qmax. \quad \text{and}$$

$$P(NxW)xW − C(xW) \geq P(NxW)x − C(x) \text{ for all } x.$$

Under the assumptions above, it is forthright to demonstrate that there is a positive Walras quantity *xW* which maximizes prices within the possibilities. Furthermore, when oligopsonistic cartels are formed in a typical state of the process they have 2 important pieces of information that are overall domain: the quantities produced by producers and market demands. Profits however are individualized for each firm and not shared. It is determinative to remember that cartels are not made to rise prices, to make firms sell more or any other perspective wrongly associated with these collusions, but to rise profits with less effort. Bearing that in mind, firms can rise profits reducing quantities in a dynamic market. Oligopsonistic agents observe quantities produced and profits realized by competitors, and then, as a first stage, reproduce quantities that led to the highest profits possible, which is a better strategy than randomly chosen uncommitted quantities. Taking the probability of chose the right quantity $= \varepsilon$, where $0 \leq \varepsilon < 1$; so the behaviour of each company isolated analysed could be described as: $(1 - \varepsilon)$ selected randomly. With the imitation rule, agents, of course, will imitate the best outcomes, eliminating the second bests, therefore market will become more Walrasian balanced. Moreover, this process occurs throughout time $(t_1 + t_2 + t_3 ...)$ and involving "N" firms, so observations will be done across time and firms gets more robust making ε smaller and smaller.

Besides, the data observed is not stochastic and continuous but qualitative and discrete instead, consequently outliers can be deleted limiting the process of imitation to a reduced distribution space of more probable outcomes leading ε to a small but positive value. A single event of a prominent high pay-off might lead oligopsonistic agents to follow this strategy for (T) periods, however, if it consistently yields low profits afterwards, the occurrence will eventually be deleted.

The interaction of these behavioural patterns will bring even dynamic markets to Walrasian equilibrium, because in case a dissonant or a deserter agent deviates from *xW* to any other quantities, pay-offs will decreased, the remaining ones will still have higher profits than those who deserted the cartel[note3.4.1.]. In some cases, deserter firm will have the chance to correct the mistake and rejoin the oligopsonistic group. Observations of this inter-temporal changes in   in a dynamic framework, inherently reintroduces better-response considerations into models of bounded rationality without explicitly if the agents tend to correct their mistakes throughout "t".

Apart from non-economic consequences, a firm which deviates to *xW* will see its profits decreasing. If this situation occurs, cartel remaining firms would also have a decrease in their profits, but spread out among them and still controlling the market, it will be proportionately smaller for them. These 2 up-shots are enough to guarantee that *xW* is stable even in dynamics cartels with imitation strategy because a non-imitating firm may earn more than the imitation followers only in short-term, and only in few cases when the run-away firm has a insight or strategic information

which allows it to have the perfect quantity that market will demand. Nevertheless, among others stimulus to imitation strategy, in real-world of economics it allows oligopsonistic firms to economize on decision costs.

The be-hoof is restricted to a short-term period because the imitation followers will correct their strategy as soon as they perceive the better tactic. On the other hand, the strategy can be only an outlier of a prominent high pay-off making agents copy this behaviour for (T) periods, but if this strategy consistently yields low pay-offs afterwards, that case will eventually be discarded. This is consistent with experimental evidence on human behaviour and allows us to make links between the imitation and experimentation process.

In the model without memory we have probability $= 0 \leq \varepsilon < 1$; the output level of firm "A" in period "t" is $= xA(t)$ and $x{-}i(t)$ is the vector of output levels of its competitors on that period. Formally, the behaviour of each firm i is described as follows: Imitation (occurs with probability $1 - \varepsilon$), but with the repetition of the process, the gap between 2 observations with new technologies of information Lim f(t)-> 0. Beyond that, imitation is not a stochastic data but deterministic one, it means: firms do not imitate randomly but the best outcomes only; and the more it is observed, the more outliers are discarded, refining results throughout (t) time, apart from the presence of exogenous inertia which, all together makes oligopsonistic collusions even closer to a Walrasian equilibrium.

3.5 – Offer Curve Inflexion:

The analysis of this hypothesis is important to dismiss any anti-thesis cases that would exclude the general theory of oligopsonistic cartel behaviour. It is necessary to exclude the hypothesis of a Giffen effect when functions do not perform as expected, leading markets authorities and researchers to false conclusions about the reasons of the unforeseen and blundering price changes.

Agricultural markets are known for being the most perfect ones to these theoretical experiments especially for 8 main reasons:

a. Non-stock products;

b. Buy motivates by necessity;

c. Perishable products;

d. Great number of buyers and sellers;

e. Seasonality;

f. Cost of transport is higher enough to prevent world monopoly;

g. Production depends not only of technology but also natural resources;

h. Symmetry of information;

When oligopsonistic cartels negotiate in markets with perishable goods, middlemen can decrease prices they pay to suppliers. On that situation, the most rational decision expected from the other side is to retain their products for a while, raising their good stocks, waiting for the re-establishment of the old standard price; but when it comes to agricultural products there is a limit for that, which is based on the perishability of the products.

On the other hand, markets using the structure of concessionaires are the most difficult to use for empirical purposes in oligopsonistic settings since prices are when not fixed by the parent company, at least controlled. Moreover, the profit margins are too small and in most of the cases there is no concurrence or, when it is existent, it is small and handled among different concessionaires' base in the same geographical zone.

However, this research intends to be a general theory for detection of oligopsonistic cartels actions through analysis of profit function behaviour, so it is necessary to no attach to any specific characteristic and have an overall view of the phenomenon of middlemen collusions and its consequences. So, examples will be used only for theoretical construction of the antithetical framing.

Time, in any market, is a very important variable, but especially in the agricultural one. It makes a huge pressure on producers who can end up selling the whole production for the lower price to minimize their losses. There is a strong incitement to middlemen act this way since these actions would end up in a huge increase of profit margin. This is a clear cartel action, but seeing from a graphic perspective, it can lead analysts to false conclusions such as Giffen phenomenon in action.

As below described, in a certain point of the graphic, the decrease in prices would guide suppliers to sell more, which is a non-rational decision from a general theory perspective, but the real reason behind the movement is suppliers trying to understate their inevitable losses, but, as it was said, such market active could induce observers to the fake conclusion that it is sort of Giffen Good in Oligopsonistic market.

Graph 12 - Oligopsonistic Offer inflexion 1st set
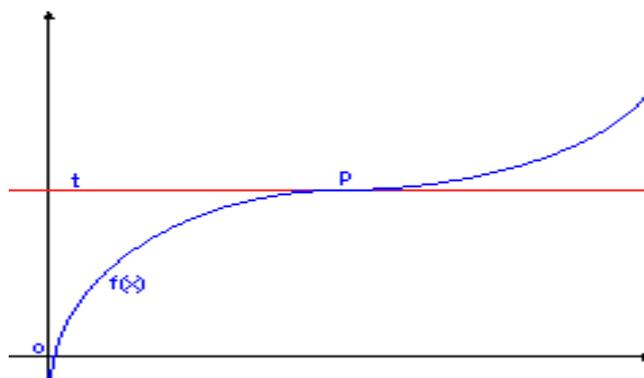
Therefore, to withdraw this hypothesis, the study of Giffen Theory in Substitution Effect is truly necessary and it can give a powerful insight to identify Cartels actions in price variations. Seen in the graphic price (p) above shown, in the *p* line there is a reversal in the previous trend. From that point on, the equation inverts its tendency and becomes downwards sloping, negatively towards price axis. From the microeconomic general theory, offer equation tends to be positive towards price when " p " rises, being irrational behaviour its negative tendency when prices decrease. Suppliers would not offer more of their product / commodity / service when consumers (or middlemen) are offering lower prices.

Although Giffen Theory is very rare in real scenarios, when it occurs in a situation like that, the only reasonable explanation possible is for this set is Giffen goods or Cartel action. So, based on the Microeconomics studies, a strongly inferior Giffen good intuits a relation between prices and quantities demanded to an essential good. This outward paradox is the reason for the negative tendency when price of some articles of mass consumption rises. This is tantamount to a fall in the real income of the consumers will reduce their expenses because of the major necessity for demanding the same quantity. Correspondingly, a fall in price of a strongly inferior good will raises the real income of consumers, and they will substitute them for better ones, thereby reducing its demand.

The specify of Giffen good cases, where is possible to draw a line straightening them out from oligopsonistic cartel actions, is that positive income effects are stronger than the negative substitution effect so that the consumer buys less of it when its prices fall.

Graphically, taking "X" is a Giffen good and "R" as the initial equilibrium point where "PQ" is the budget line, the tangent to the indifference curve is "l_1". When price of "X" falls and the consumer moves to point "T" of the tangency between the budget line "PQ" and the curve "I_2" from point "R" to "T" is the price effect whereby he reduces his consumption of "X" by "BE".
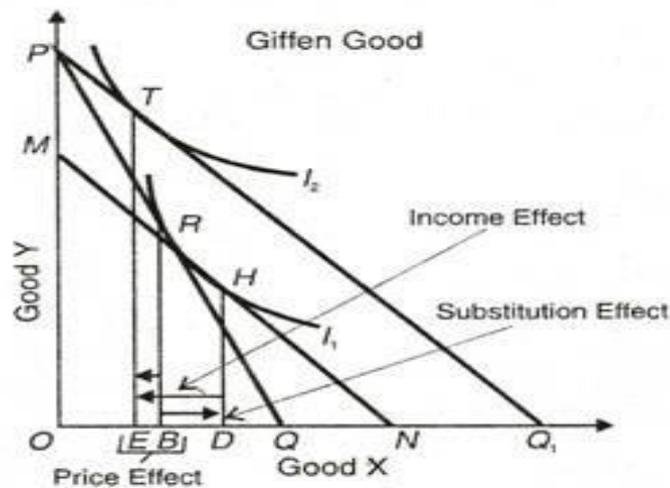
Observing the graphic above if the price of Good "X" decrease, consumers' real income will increase moving the budget line from "MN" to "PQ$_1$". The original curve "I$_1$" at point "H" moves to the point "R" along the "l$_1$" curve. As we see, consumers will have more of "Y" and less of "X" which was the good that became cheaper. This apparently non-rational choice is the negative substitution effect when the good can be classified as "Giffen" and it can easily be confused with oligopsonistic effects.

In order to verify if we are facing oligopsonistic effects or Giffen ones, it is necessary to analyze the sort of good is "X" (inferior or superior), and, moreover, going deeper in the analysis, it is unavoidable following the Hicks theory, who says that Giffen's good have to satisfy the 5 basic conditions: a. weak substitution effect;

b. It must be responsible for large part of the consumers' expenses;

c. It should compromise considerable percentage of consumers' incomes;

d. it might be an inferior good; and,

e. Savings have had to been used to buy the complementary or rival good.

When price of Good "X" come back to the past position, if consumer moves from point "H" to "T" reducing the consumption of "X" in the quantity "DE", so we can assume that what happened before was an oligopsonistic cartel effect. However, if the return to old price level makes the market comes back to the previous equilibrium point, so this is an effect of the Giffen good, since its quantity demanded was reduced by "DE" to compensate the price variation.

Summing up, if the decrease in the price of good "X" leads to a decrease to the quantity demanded, it is a denotation of oligopsonistic action if it is possible to move the case of a Giffen

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good away. It is important to remind that it must be read from the middlemen -> producer perspective only. This negative effect occurs because it is stronger than the positive substitution effect since middlemen are under collusion structure, thus producers have no options apart from selling for a lower price.

The quantity sold increase depending of the market is under one or few circumstances described in the introduction of this section. Some markets are more sensitive than others, which will change the dimension of the impact, but in any case, it is measurable. For final consumer, price effect: {BE = DE (+ or -) BD (substitution effect)} can be null or positive in short or middle term, but in long term it will be positive. Prices rise because producers reduce their expectations and few of them will go in bankruptcy. So, the society loses as whole at the expense of a tiny group of middlemen acting in collusion.

3.6 – Income Effect in Oligopsonistic Markets:

According to Slutsky, if a same quantity of money is given to the consumer in order to purchase her/his old bundle at the new prices, choice changes. If instead we find a new budget line with slope determined by the new prices, but tangent to the indifference curve going through the old bundle, the difference between the new point of tangency and the old bundle is null.

However, if hypothetically the same consumption bundle was to be retained, income would be freed up which could be spent on a combination of more of each of the goods. Income effect for particular services or goods, especially those studied by the Scottish Economist Robert Giffen, where an increase in a price of a product or service increases its demand; so, the relation between them is positive and therefore its demand curve augments together with prices. This behaviour is clearly different from most services and products in general Economy, which are most demanded as its price falls, since this is the most common and rational consumer conduct.

The Giffen analysis, however, is crucial for this research, since, isolated other variables, this unexpected behaviour can give a clear denotation of oligopsonistic forces in action. Another microeconomic impact in imperfect competition markets is that income effect is more sensitive in demand than the substitution effect. Oligopsonistic markets usually exhibits very low features to substitution effects, must cause by 2 reasons:

1st: Inter-dependent decision-making, which means firms, must consider the rivals' likely

reactions of any change in price policy;

2nd: Non-price competition is a consistent feature of the competitive strategies of oligopolistic firms thus there is consumer loyalty because of the lack of comparisons after a while that Cartel was established or consumers' inertia.

In oligo-structures of markets the most known form of cartel is price fixing agreements, however, the primary characteristic of the Cartel Model is collusion and it does not necessarily mean in prices, it can be sharing markets among competitors or restricting new entrepreneurs to enter in the market (entry barriers) are also very common practices in cartels although less known;

If the dominant firms in an oligopsonistic structure can successfully collude to fix prices, then they can be certain of each other's output, which will allow them to maximize their profits by producing the exact quantity where marginal revenue equals marginal cost, just as it would be for a monopsonistic market. However, if any of the firms cheat, then a price war may ensue, lowering the profits of all firms, and perhaps even causing them to operate a loss for a while.

The oligopsonistic sharing market agreements are mostly presented in 2 types: geographical and quotas; in both cases, however, they cause no risks of the price war, since prices policies are differentiated for area or percentage; notwithstanding, this technique completely overrides the consumer's power of price substitution which is the essence of the free market.

A general rising of wages makes services and goods more expensive to workers, but not proportionally, since salaries are not the only variable in production costs. Likewise, when wages rise workers tend to opt for more leisure and less work as a natural economic phenomenon if labourer individually controls the supply of labour force. This rational decision also makes pressure to raise prices.

Analysing isolated the rise of incomes phenomenon also contributes for the wave form of oligopolistic agents' profits, because, although prices rise, demand will also rise, since relatively consumption power grows and the pressure over the demand, and by consequence, by middlemen as seller, grows too. The new consumers' power, apart from leading prices to rise, marginally makes also middlemen buy more from producers to fulfil the new demand, reducing middlemen power to manipulate producers, which will compensate the initial trend, making the peculiar bending curve based on indifference analysis of consumption and worker choices that this thesis is all about.

Graphically, it is possible to see the curve trend which separates substitution effect from the income one as follow:
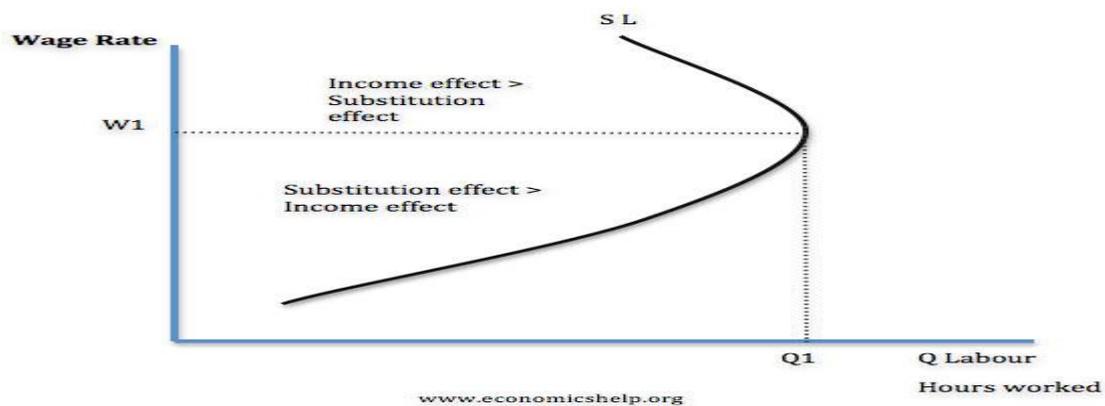
This curve trend bring income effect to an unstable equilibrium, always fluctuating around the (W1 / Q1) point. Natural variations around this point, since equilibrium is always precarious due market forces, analysed throughout time will give the wave format in intermediate profits.

Summing up, it is possible to conclude that oligopsonistic structures of market will harm buyers and producers. Consumers will face a reduction in their consumption bundle even if they have an increase in their incomes, less than proportional but still a non-justifiable impairment from their point of view, since they would get fewer units of the good at a higher price, which means they would have less money for other needs and, therefore, effective demand for other sellers will be reduced. From the producers' perspective, the general income rise will not reflect, as explained, in a proportional raise of their profits, instead it can imply in more production (which means for them = more work) with the old economic return level. For the market, the oligopsonistic cartel indirectly prevents the possibility that in other areas of production, innovation, new companies are established or existing ones have a wider market.

Therefore, the existence of an oligopsonistic cartel can be traced also by analysis of general income levels compared to consumers' proportional rise of consumption power. An asymmetric rise where consumers get less than their income levels rise is a sign of the existence of exogenous forces operating into markets. This, conjugated with an asymmetric rise in producers' profits, where they get less than they graphically should is a potent clue of the existence of oligopsonistic actors in action.

Ting up loose ends, these 2 proportional losses (consumers and producers) are not lost in market vacuum or emptiness, but they are absorbed by oligopsonistic structures generating productive efficiency for the producers and loss of welfare for consumers. Society as whole loses.

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[42] http://www.economicshelp.org/blog/glossary/income-substitution-effect/

Chapter IV – Theoretical Approach Criteria:

4.1 – Imperfect Price Transmission at Non-Competitive Markets:

The empirical work in Industrial Organization by studying non-competitive markets behaviour has popularized to understand how each producer imbues its rational preferences, so that the decision-making process results in the optimum output, given the environment. In this sense, the production theory reports the profit maximization as the main objective of firms and their process of welfare earning at the competitive marketing is widely known in economic sciences, according Azzam and Pagoulatos (1990) and Varian (1992).

Nevertheless, the increasing literature at non-competitive markets keeps finding new achievements about the producers' behaviour under market power concentration. Despite those findings, Azzam and Pagoulatos (1990) have shown that most of those efforts usually focuses in the output markets, while the factor market and its relation to the final market keeps neglected by the literature.

It corroborates with Mas-Colell *et al.* (1995) demonstration that certain market frameworks promote power concentration and consequently the competitive equilibrium shifts to in order to benefit those agents in the stronger market position. Dowbor (2014) states that some intermediate markets use to attend this setting, mainly in necessary goods markets, once the necessary goods factor markets are at least oligopsonistic and output markets use to be oligopolistic.

Besides it, Meyer and von Cramon-Taubadel (2004) states that the microeconomic theory has also a special interest in market integration process and the price transmission asymmetry role to define both the resource allocation, the output and intake mix decisions. According Peltzman (2000), the main finding in this area is the asymmetric price transmission exhibit a pattern to be the rule rather the exception. In this sense, under the vertical market integration perspective, it may be a market failure caused by asymmetric price transmission.

Given this key conclusions, Meyer and von Cramon-Taubadel (2004) and Vavra and Goodwin (2005) studied the asymmetric aiming classify their different types and causes, as well as to propose econometric models and techniques to quantify it. Furthermore, Wang *et al*. (2006) suggest a theoretical approach that, in addition to studying the asymmetry, prevalence and magnitude of price transmission, it also seeks to analyse their sensitivity to price and supply shocks.

The existence of imperfect price transmission may indicate a market failure and consequently some net welfare loss. Thus, it is important to evaluate the incidence of asymmetry in the transmission of vertical price in order to indicate the need for policies to ensure the resumption of welfare. Hence, we seek to study the vertical relation between the primary and final market from the intermediate industry perspective.

Moreover, we explore the mechanisms of market power by price transmission to analyse how the agents concentrate power at these oligopsonistic and oligopolistic structures. Furthermore, we intend determine if there is inter-temporal dependence between prices both structures. Thereby, on this chapter we aim to verify econometrically if the presence of market power at intermediate markets establish non-competitive advantage over primary producers and final consumers by imperfect price transmission.

Thus, we choose to model the vertical price transmission, following Weldegebriel (2004), Meyer and von Cramon-Taubadel (2004), Kaiser and Suzuki (2006) and Wang *et al.* (2006), from the primary sector unto the final market by the intermediary industry standpoint to understand if the intermediate producer market power induces them to transmit prices imperfectly, seeking the increase their surplus by creating market inefficiencies and, therefore, causing losses to other market participants. On the other hand, we choose to follow Vavra and Goodwin (2005) and Hansen (2016) to analyse the inter-temporal prices dependence and to propose an inter-temporal price transmission elasticity.

To accomplish this study main goal, we organized this paper in six sections. Besides this Introduction, the next one presents the possible theoretical approach to analyse the intermediate market and its price transmission criteria. The third section presents the theoretical framework with the general estimation model and a discussion about the equilibria displacement caused by an exogenous supply shock.

The following section discusses the price transmission elasticity when market power and the returns to scale measure interact and elucidate a special case of the intermediate producers' behaviour at necessary good markets. We discuss the prices time dependence as well its estimation and general tests in the fifth section. Finally, the last section concludes this study, presenting the main findings of this theoretical discussion and propose new perspectives to future contributions in this literature.

Zeidan (2005) states that the traditional model to estimate market power follows Bain (1951). The main criteria to use this approach implies that the relation between the industry structure, the business conduct and the market performance is stable, causal and observed by accounting data, according Bresnahan (1989).

In this sense, we could measure the market power by the difference between prices and marginal costs and by approximations of the Lerner index and economic profits as Mas-Colell *et al.* (1995) and Varian (1991) shows. However, Kaiser and Suzuki (2006) demonstrate the limitations of Bain (1951) model make its results falsifiable, once that model suggests the causal relation between the industry structure and its performance. Bain (1951) model faces other critical limitation by not considering the elasticities, the incentives to producers, and barriers to potential entry of competitors in its market power composition.

Besides it, according Fiuza (2001), is noteworthy that the industry accounting database does not provide clear information about marginal cost and, at the special case of cross-section data selection, the structural parameters may be non-identifiable.

To Zeidan (2005), the NEIO approach hold some Bain (1951) model assumptions, but its empirical formulation is not based at the Game Theory and, subsequently at an observable marginal cost. Parsons and Vanssay (2013) state that the NEIO approach framework assume that marginal costs are most probably unobservable, cross-section samples of industries does not hold to estimate the industry behaviour and the individual firm and industry conduct are the estimation parameters.

Econometrically, Baker and Bresnahan (1992) and Zeidan (2005) present three valid ways to estimate the market power using the NEIO approach – they are (1) the production response to demand price elasticity, (2) price response to marginal cost shifting and (3) multiple price schemes detecting. Despite the literature consider first method easier to estimate, the better fit to this study purpose is the third one, once we can observe the prices at primary and final market and study the intermediate producers price-transmission.

4.2 – Types and Causes of Price Transmission:

Azzam *et* Pagoulatos (1990) and Kaiser *et* Suzuki (2006) consider that in oligopoly and/or oligopsony in the intermediate production level can transmit prices imperfectly by applying different prices conduct. Besides it, that this imperfect price transmission generally occurs in necessary goods industries (Dowbor, 2014). Sexton *et* Zhang (2001) states that usually in cases of intermediate agents' market power concentration, both the primary suppliers and final consumers are price takers and Dowbor (2014) consider this excessive market power as the main intermediate industry instrument to practice imperfect price transmission.

However, the literature that studies the impact of market price transmission have found no evidence to corroborate that exercise market power in both the primary and final sector is a sufficient condition to guarantee that intermediate producers practice price control intending increase their market surplus.

Furthermore, Azzam and Pagoulatos (1990) and Wang *et al.* (2006) observed that the price controlling can result at net social welfare loss, but when the intermediate producers' oligopolistic power concentration is greater than its oligopsonistic concentration power, their market surplus increases relatively to a competitive benchmark.

In that case, when intermediate producers have oligopolistic power relatively greater than their oligopsonistic power, Dowbor (2014) states that from the oligopsony producers' standpoint their economic surplus loss can results negative profit in a considerable share of the market. From the oligopoly consumers' standpoint, the opportunity cost of paying non-competitive prices causes preference to consume substitute and/or inferior goods, thus decreasing their utility (Varian, 1992).

Meyer and von Cramon-Taubadel (2004) categorize the price transmission with respect to the adjustment, who indicates whether is the magnitude or the speed of transmission present asymmetry, to the signal when the price transmission is positive or negative and to the direction, i.e. if the prices transmission in the market is vertical or spatial.

The adjustment criteria are observed at Graph 20. Note that we assume dependence between wholesale and retail prices. In this sense, the three graphs of Figure 1 describe how some shock in wholesale prices (R) is transmitted to retail prices (P). Wherefore, it can be noticed at Graph that the magnitude of price transmission depends on the wholesale price shock. I.e. Increases in the wholesale prices are fully transmitted to retail prices, but decreases in wholesale prices are not fully transmitted to retail prices

The Graph 21 shows the different speeds of adjustment in retail prices as result of a wholesale prices change. Observe that in case of wholesale prices expansion the adjustment speed in retail prices is shorter than in case of wholesale price retraction. According to Tirole (2004) and Vickers (2005), this is a reasonable assumption, once the retailers use to be cautious to reduce prices, given a cost decrease. That because of two main reasons: the first one is that there is a lag between the input and the output at short term and the second one is because the market prices adjustment occurs first in the quantity of producers and then at the market prices (Varian, 1992). Besides that, the Graph 22 combines the analyses at Graph 20 and Graph 21. In that case, observe that the price transmission is imperfect and asymmetric, i.e. any shocks in wholesale prices causes lagged changes at retail prices with a different magnitude.

It is noteworthy that, not only to cases of perfectly inelastic demand, when the asymmetry as well the imperfection at price transmission are caused by a market power concentration process, the recursive use of this price controlling can lead the market equilibria to oligopoly level and, in the long term, the intermediate producers starts to practice monopoly prices. Moreover, observe that it may configure a collusion, what implies necessarily in net welfare losses.

Price Transmission – Adjustment Criterion

Graph 22
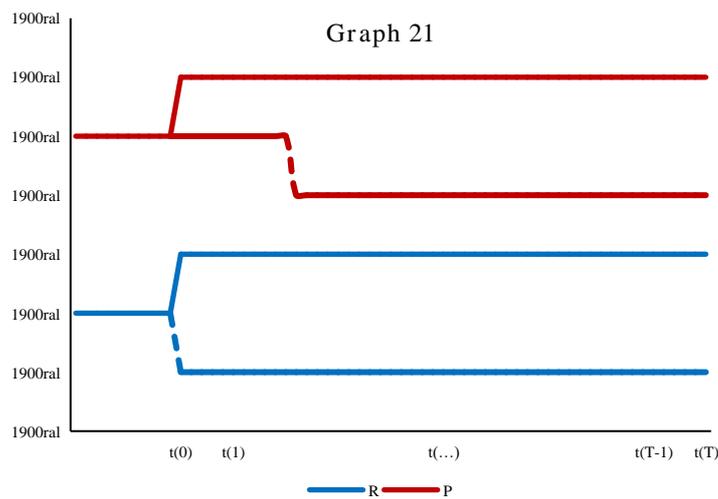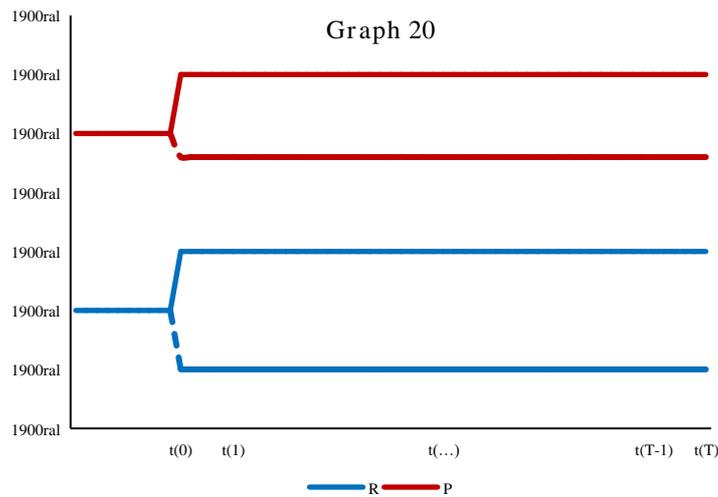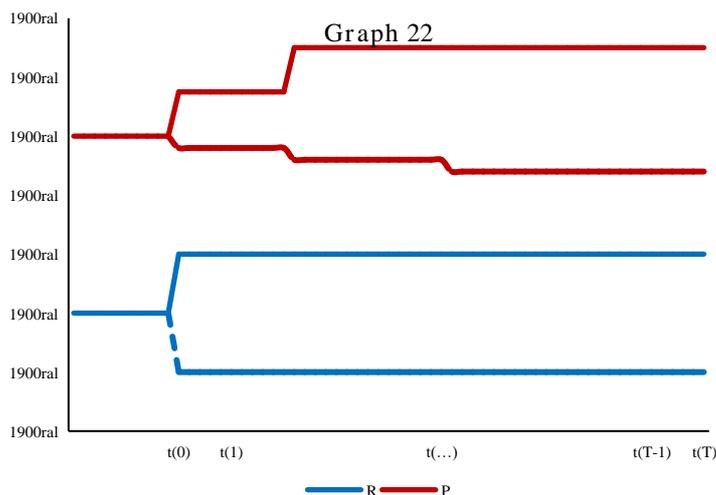
The second criterion of price transmission analysis concerns to observe the signal of transmission, i.e. when the transmission is positive or negative. Following Peltzman (2000) and Meyer and von Cramon-Taubadel (2004) description, Figure **Erro! Fonte de referência não encontrada.** presents respectively the positively asymmetric, the negatively asymmetric and the symmetric price transmission cases.

Price Transmission – Signal Criterion
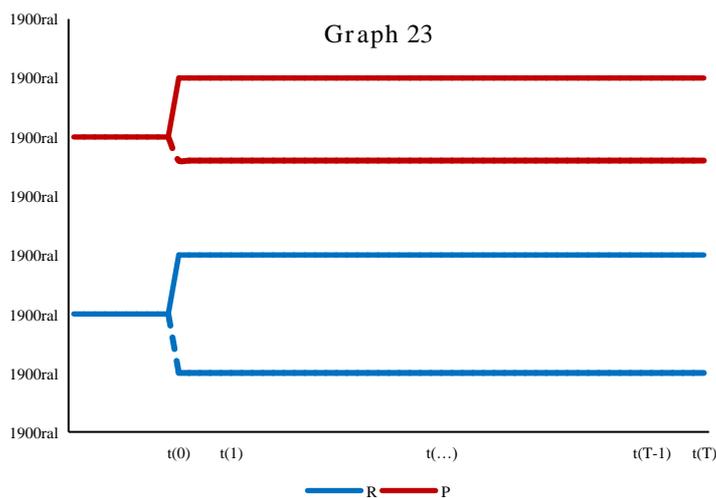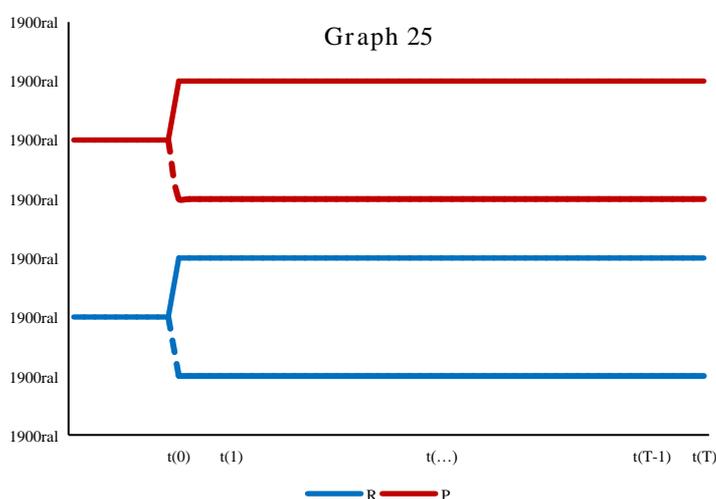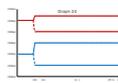
Graph 23

Graph 25

As seen in Graph 21, when the retail prices respond either more rapidly or fully to increases in the wholesale prices than to a decrease, the asymmetry is positive. On the other hand, when the retail prices reaction to increases in wholesale prices occurs either less rapidly than to a decrease, the price transmission is classified as negative, as shown in Graph 22. As well, the Graph 23 makes it possible to analyse a symmetric price transmission case, i.e. when either an increase or a decrease in the wholesale prices triggers equally either rapid or full shifting at retail prices.

See that the classification with respect to the asymmetry signal denotes the deviation relative size between the change in retail prices responding to a shock that increases the wholesale prices and its result to a decreasing shifting at wholesale prices. In this sense, Peltzman (2000) shows that the analysis aiming to respond what is the best type of asymmetry in price transmission shall not be interpreted by the normative fashion. Thus, as seen at Graph 24**Erro! Fonte de referência não encontrada.**, the negatively asymmetric price transmission leads the market to a better result at consumers' standpoint, once that case implies that an increase at wholesale prices causes a lesser

adjust at final prices. Hence it is observed a case of price under-transmission. In the contrary case, when the wholesale prices decrease, there is a price over-transmission. So, the retail prices shall reduce more than proportionally.

Finally, the analysis of direction is third criterion to classify price transmission symmetry (Meyer and von Cramon-Taubadel, 2004). Barros and Burnquist (1987) consider that vertical price transmission denotes the relative variation between prices of different productive levels, as well the result of relative change in the output prices to any input prices shifting. On the other hand, in cases of competitive pricing, when identical goods are transacted at the same productive level in diverse regions, the relative variation between those different regions prices is described as spatial (horizontal) price transmission (Costa Junior *et al.*, 2016). In this paper, we only study the case of vertical price transmission because it is a better fit to achieve its main objective.

The Figure 1 and the Figure 2 illustrate some hypothetical price transmission examples in case of any price shocks at primary market. Note that, considering **Erro! Fonte de referência não encontrada.** the primary market price and **Erro! Fonte de referência não encontrada.** the final market price, an instantaneous shock in **Erro! Fonte de referência não encontrada.** triggers a **Erro! Fonte de referência não encontrada.** length response in **Erro! Fonte de referência não encontrada.**. Vavra and Goodwin (2005) states that the relative effect between **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** shows how imperfect is the price transmission exerted by the intermediary industry. Thus, we have:

$$\frac{\Delta P}{\Delta R} \begin{cases} > 1 \Rightarrow price\ overtransmission; \\ = 1 \Rightarrow price\ fully\ transmission; \\ < 1 \Rightarrow price\ partial\ transmission; \end{cases} \tag{30}$$

The literature presents several causes that result in imperfect price transmission. Nevertheless, given that this study seeks to analyse the price transmission in the productive chain from the intermediary industry standpoint, we only present those causes who triggers vertical price transmission.

This constraint leads to a few key issues which triggers some imperfect price transmission process. Meyer and von Cramon-Taubadel (2004) and Vavra and Goodwin (2005) state that among those key issues, the market structures with low degree of competitiveness and adjustment costs are the two central causes of price transmission.

Means (1935) shows that both the market power concentration and the adjustment in menu costs occurs mainly because it induces the market to some level of price rigidity or 'stickiness'. As seen in Blinder *et al.* (1998), there are. Nevertheless, according

Asymmetry is closely related to the issue of price rigidity or 'stickiness' (Means, 1935). Blinder et al. (1998) offer an extensive overview of different explanations for rigidity. Note as well that asymmetry is not only of interest regarding price transmission. Traill et al. (1978) and Young (1980) study asymmetric supply responses, and Farrel (1952) studies asymmetric demand functions while vande Kamp & Kaiser (1999) and Granger & Teräsvirta (1993) consider asymmetric advertising-demand response functions and business cycles, respectively.

4.3 – Theoretical Framework:

To a market structure characterized by market power and to an industry technology characterized by non-constant returns to scale, we develop a model following Wang *et al.* (2006) to evaluate the price degree transmission by setting quantity conjectural variations. To attend the principles of an oligopolistic/oligopsonistic market, we assume the final product homogeneous to all firms (Mas-Colell *et al.*, 1995. Zeidan, 2015) and we also assume following Azzam and Pagoulatos (1990) the firms competing among themselves, taking input quantities as strategic variables. Wang *et al.* (2006) states based on conjectural variations, is usual the that firms interact among themselves. In this sense, we also assume this hypothesis.

Since capital is an almost fixed factor, is consistent to assume a short-run equilibrium whereby firms change only their variable inputs in profit maximization. Moreover, we assume the oligopolistic intermediate producer exercises market power in its supply shocks and equilibria displacement relation with consumers and oligopsonistic power in its relation with suppliers of the primary producers and following Wang *et al.* (2006) seems convenient suppose the final sector does not exercise any oligopsony power over the intermediate producers and primary sector suppliers exercise no significant market power over the intermediate producers.

Extending Kaiser and Suzuki (2006) model consider an intermediate market with **Erro! Fonte de referência não encontrada.** firms competing among themselves, which combines a primary sector product and a marketing input to produce a final good to consumers. Now, following Wang *et al.* (2006) there is a six-equation setting whose describes this initial equilibrium.

If **Erro! Fonte de referência não encontrada.** is the price of the processed product and **Erro! Fonte de referência não encontrada.** is the demand for the primary market product, the primary product inverse demand is given by

$$R = h(Q) \qquad (1)$$

Since **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** are the primary sector and marketing inputs respectively, we may represent the intermediate industry production function by

$$Q = F(A,M) \qquad (2)$$

where **Erro! Fonte de referência não encontrada.** is homogeneous of degree **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.**. Notice that albeit the marketing input might be a combination of several variable inputs (e.g., labour, packaging, transport, etc.), we follow Wang *et al.* (2006) and assume it to be a single input. Besides it, observe that when **Erro! Fonte de referência não encontrada.** the production function presents decreasing returns to scale, if **Erro! Fonte de referência não encontrada.** the production function presents constant returns to scale and if **Erro! Fonte de referência não encontrada.** it presents increasing returns to scale[43].

$$P = k(A,Z) \qquad (3)$$

$$W = g(M) \qquad (4)$$

The inverse form of the supply relations for **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** follows respectively **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, since we consider **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** the prices of **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** respectively and let **Erro! Fonte de referência não encontrada.** represents a exogenous supply shifter. To aggregate[44] the input demand functions, we shall consider that **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** are respectively the elasticities of intermediate industry level demand for the final product and for the primary supply, whereas the elasticities of conjectural variations in the final sector and in primary sector are **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** respectively. In that case Sexton and Zeng (2001) recalled that we may write the first order condition which guarantee the maximum profit equilibria as the Equations **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, where **Erro! Fonte de referência não encontrada.** and **Erro!**

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[43] For more, see: Mas-Colell *et al.* (1995) *et* Varian (1992).

[44] For aggregation issues, see Bhuyan *et* Lopez (1997).

Fonte de referência não encontrada. marginal products are given by **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, the price mark-up in the final market input is expressed by **Erro! Fonte de referência não encontrada.** and the mark-down in the primary sector by **Erro! Fonte de referência não encontrada.**.

$$R\left(1+\frac{\theta}{\eta}\right)f_A = P\left(1+\frac{\phi}{\varepsilon}\right) \tag{5}$$

$$R\left(1+\frac{\theta}{\eta}\right)f_M = W \tag{6}$$

The industry level input demands observed in **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** is obtained by the sum of the **Erro! Fonte de referência não encontrada.** firms over the representative firm first-order condition derived for a maximum of profit with respect to **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**.

4.4 – Supply Shocks and Oligopsonistic Binary Choice:

By total differencing and conveniently expressing by percentage changes approximated by the natural logarithm form following Maddala (1971) and Chiang and Wainwright (2005), we may observe the initial equilibria displacement effect by an exogenous supply shock Equation in system **Erro! Fonte de referência não encontrada.** to **Erro! Fonte de referência não encontrada.**, according Wang *et al.* (2006) as it follows

$$d\ln Q = \psi_A d\ln A + \psi_M d\ln M \tag{7}$$

If the market structure is characterized by market power with non-constant returns to scale in the industry technology, the value shares of **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** are respectively denoted by **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. In equilibrium and assuming constant returns to the scale and in absence of market power, **Erro! Fonte de referência não**

encontrada.. It means that it will reduce to the cost shares **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** respectively.

$$d \ln Q = \eta d \ln R \qquad (8)$$

The Equation **Erro! Fonte de referência não encontrada.** denotes the demand price elasticity of intermediate producer in the final market. We observe the supply price elasticity inverse of the intermediate industry to the primary market in the Equation **Erro! Fonte de referência não encontrada.** – usually **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**.

$$d \ln P = \varepsilon^{-1} d \ln A + v d \ln Z \qquad (9)$$

The parameter **Erro! Fonte de referência não encontrada.** in **Erro! Fonte de referência não encontrada.** denotes the elasticity of primary sector supply to exogenous supply shocks and the marketing partial supply inverse elasticity is denoted by the parameter **Erro! Fonte de referência não encontrada.** in **Erro! Fonte de referência não encontrada.**.

$$d \ln W = \gamma d \ln M \qquad (10)$$

Now, since we assume that **Erro! Fonte de referência não encontrada.** represents the elasticity of substitution between the primary market and marketing inputs and **Erro! Fonte de referência não encontrada.** denotes a change in the mark-down which follows an exogenous supply shock, such that **Erro! Fonte de referência não encontrada.**, given **Erro! Fonte de referência não encontrada.**, we have:

$$d \ln P = \frac{1+\mu}{1+\delta} d \ln R + \frac{1}{1+\delta} \left[(\rho - 1) - \frac{1+\sigma(\rho-1)}{(1+\delta)\sigma\rho} \beta \right] d \ln A \\ + \frac{1+\sigma(\rho-1)}{(1+\delta)\sigma\rho} \beta d \ln M \qquad (11)$$

where, by the other hand **Erro! Fonte de referência não encontrada.** is the magnitude of deviation in the mark-up which follow an exogenous supply chock.

Finally, we can observe that:

$$d \ln W = (1+\mu) d \ln R + \frac{1+\sigma(\rho-1)}{\sigma\rho} \alpha d \ln A \\ + \left[(\rho - 1) - \frac{1+\sigma(\rho-1)}{\sigma\rho} \alpha \right] d \ln M \qquad (12)$$

Once we understand that **Erro! Fonte de referência não encontrada.** impacts all the endogenous variables (**Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**), seems convenient to manipulate the Equations **Erro! Fonte de referência não encontrada.** to **Erro! Fonte de referência não encontrada.**, such they attend the following three-equation system:

$$-\eta d\ln R + \alpha\varepsilon d\ln P + \frac{\beta}{\gamma}d\ln W = \alpha\varepsilon v d\ln Z \tag{13}$$

$$\frac{1+\mu}{1+\delta}d\ln R + \left[\frac{\sigma\rho(\rho-1)-[1+\sigma(\rho-1)]\beta}{(1+\delta)\sigma\rho}\varepsilon - 1\right]d\ln P + \frac{1+\sigma(\rho-1)}{(1+\delta)\sigma\rho\gamma}d\ln W$$
$$= \frac{\sigma\rho(\rho-1)-[1+\sigma(\rho-1)]\beta}{(1+\delta)\sigma\rho}\varepsilon v d\ln Z \tag{14}$$

$$(1+\mu)d\ln R + \frac{1+\sigma(\rho-1)}{\sigma\rho}\alpha d\ln P + \left[\frac{\sigma\rho(\rho-1)-[1+\sigma(\rho-1)]\alpha}{\sigma\rho} - 1\right]d\ln W$$
$$= \frac{[1+\sigma(\rho-1)]\alpha}{\sigma\rho}\varepsilon v d\ln Z \tag{15}$$

According Wang *et al.* (2006), the elasticity of price transmission from the factor market to the output market through **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. Algebraically, we denote it by **Erro! Fonte de referência não encontrada.** as it follows:

$$\tau = \frac{\rho\psi_A(1+\delta)(1+\sigma\gamma)}{\{(1+\sigma\gamma)[(1+\mu)\rho + \eta(\rho-1)] - (1-\psi_A)\eta\gamma\}^2} \tag{12}$$

Considering a non-competitive scenario where intermediate dealers have only the binary choice to improve their profits, which are: increase final prices or decrease entry prices, thus the potential outcomes for an econometric model can be set as:

$$Y = DY_1 + (1 - D)Y_0$$

Where $D \in \{0, 1\}$ is a binary treatment and (Y_0, Y_1) are likely outcomes corresponding

to different middlemen market position[45]. This research, based on a paper of Torgovitsky (2015), observed 2 variables as aforementioned (+) a co-variable related with some stochastic market conditions, that we call X. So, *(Y;D;X)* where X is a vector of covariates with respect to which certain rejections and / or independence conditions might be maintained. Analysis of this question frequently maintains a weakly separable selection equation.

$$D = 1 [U_D \leq gD(X)]$$

Where U_D is a possible variable and gD is an unknown function. The two-sector model analysis cover oligopsonistic power, whether it is exercised as a buyer or as a seller, to refers in a case in which the effect of X on Y_0 and Y_1 is expressed in:

$$Y_d = g_d (X, U_d) \quad for \quad d = 0 , 1;$$

Where U_d , $d = 0$, 1 is random variables and g_d, $d = 0, 1$ is unknown functions. The functions g_d can be parameterized, or an independent approach can be taken by setting:

$$g_d (X, U_d) = U_d,$$

in which case U_d is simply a relabelling of the potential result of Y_d. Comprising both equations together we will have:

$$Y = D_{g1} (X, U_1) + (1 - D)_{g0} (X, U_0)$$

$$D = 1 [U_D \leq {}_{gD} (X)]$$

According to Torgovitsky (2015) with 2 internal random variables (Y , D) and 1 external random vector (X), and an L = 3-dimensional vector of unobservables (U_0 , U_1 , U_D) . The model structure $S = (h , F)$ is composed of the structural function $h = (g_0, g_1 , g_D)$ and the conditional distribution function:

$$F : \mathbb{R}^3 \times X \implies [0 , 1] \text{ for } (U_0 , U_1 , U_D).$$

and assuming for concreteness that g_0 and g_1 are invertible in their components, a given structure S generates a distribution of (Y , D)[46] through the relationships between the variables. With all this being said, we can see that middlemen, when operate as wholesale traders, imply that the general demand and cost structures equations should be enhanced to take the varying firm characteristics into account. Moreover, the definition of particular demand and cost equations allows one to make more specific inferences about the pricing behaviour implied by the empirical specification of these equations is dealt within a rudimentary manner; a more detailed explanation of the underlying hypothesis.

Dalen *et* Thurik (1998) suggest that the estimation results for the demand equation in

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[45] As a buyer from producer or as a seller to final consumers.

[46] Conditional on *X*

oligopsonistic markets support the assumption of imperfect competitive behaviour. Merchants meet a positive downward sloping and differentiated demand for their products and services when they act using their market power. The average price elasticity for the model with the normal-distributed pricing condition is plausible, whereas the relatively low price can be attributed to the advantageous access of outsiders (exporters).

With the normal-distributed pricing condition in accordance with market expectations, contrary to those of the unrestricted model. The shift factor is found to be positively influenced by sales to foreign wholesalers and promotional activities. Moreover, the price elasticity of the demand increases with sales to wholesalers whereas it decreases with the share of exports (competitive markets, no thresholds).

4.5 – Price Transmission Elasticity, Market Power and Returns to Scale Measure:

It can be noticed that, among other things, the returns to scale and the market power parameter determine the price transmission elasticity. By differentiating **Erro! Fonte de referência não encontrada.** with respect to **Erro! Fonte de referência não encontrada.**, we observe the shifting returns to scale effect in the price transmission elasticity. Although this impact cannot be determined, because **Erro! Fonte de referência não encontrada.** assumes different signs depending of the supply functional form:

$$\frac{\partial \tau}{\partial \rho} = \frac{-\psi_A (1+\delta)\eta}{\{(1+\sigma\gamma)[(1+\mu)\rho + \eta(\rho-1)] - (1-\psi_A)\eta\gamma\}^2} \qquad (13)$$

For this purpose, assume a linear supply function. In this specification, an inelastic function, when **Erro! Fonte de referência não encontrada.**, indicates **Erro! Fonte de referência não encontrada.**. Otherwise, a unitary either an elastic supply (**Erro! Fonte de referência não encontrada.**) function implies that **Erro! Fonte de referência não encontrada.**.

Now according Wang *et al.* (2006), without any loss of generality we may assume a perfectly elastic marketing supply, so **Erro! Fonte de referência não encontrada.**. Then,

$$\frac{\partial \tau}{\partial \rho}\bigg|_{\gamma=0} = \frac{-\psi_A (1+\delta)\eta}{[(1+\mu)\rho + \eta(\rho-1)]^2} \Rightarrow \begin{cases} > 0, \forall \delta \geq 0 \\ < 0, \forall \delta < 0 \end{cases} \qquad (14)$$

Note that **Erro! Fonte de referência não encontrada.** is usually negative and the denominator is always positive. Hence, when the supply is unitary either elastic (**Erro! Fonte de referência não encontrada.**) the returns to scale measure (**Erro! Fonte de referência não encontrada.**) increases the elasticity of price transmission (**Erro! Fonte de referência não encontrada.**). Contrariwise, when the supply is inelastic (**Erro! Fonte de referência não encontrada.**), the return the returns to scale measure decreases the elasticity of price transmission.

Besides the intermediary producer exercise market power in the primary market as well in the final market, Wang *et al.* (2006) states that, *a priori*, to evaluate the price transmission deviation is difficult in a non-competitive market with non-constant returns because of the non-constant scale returns in this industry technology.

To understand it, consider a perfectly competitive setting. I.e., let the returns to scale be constant (**Erro! Fonte de referência não encontrada.**) and assume that both the mark-down and the mark-up do not change (**Erro! Fonte de referência não encontrada.**), what implies in null elasticities of conjectural variations in the final sector and in the primary sector (**Erro! Fonte de referência não encontrada.**). In that sense, the price transmission elasticity is given by

$$\tau^c = \frac{S_A(1 + \sigma\gamma)}{(1 + S_A\sigma\gamma) - (1 - S_A)\eta\gamma} \tag{15}$$

Now, by dividing the competitive price transmission elasticity by the non-competitive one, then considering a perfectly elastic marketing supply (**Erro! Fonte de referência não encontrada.**), we have

$$\frac{\tau^c}{\tau} = \frac{(1 + \theta/\eta)[(1 + \mu)\rho + \eta(\rho - 1)]}{(1 + \phi/\varepsilon)(1 + \delta)} \tag{16}$$

Next, observe in the Equation **Erro! Fonte de referência não encontrada.** that assuming **Erro! Fonte de referência não encontrada.**, relative the competitive benchmark, noncompetitive markets characterized by decreasing returns to scale presents a smaller price transmission elasticity, whereas in those noncompetitive markets characterized by increasing returns to scale, the price transmission elasticity is greater.

$$\frac{\tau^c}{\tau} = \rho + \eta(\rho - 1) \Rightarrow \begin{cases} > 1, \forall \rho < 1 \\ = 1, \forall \rho = 1 \\ < 1, \forall \rho > 1 \end{cases} \tag{17}$$

Moreover, to observe the market power role in price transmission, assume **Erro! Fonte de referência não encontrada.** in **Erro! Fonte de referência não encontrada.**:

$$\frac{\tau^c}{\tau} = \frac{(1+\theta/\eta)}{(1+\phi/\varepsilon)}\frac{(1+\mu)}{(1+\delta)} \tag{18}$$

The Equation **Erro! Fonte de referência não encontrada.** makes evident the non-competitive market price transmission elasticity deviation from the competitive one is related to the mark-up (**Erro! Fonte de referência não encontrada.**) and mark-down (**Erro! Fonte de referência não encontrada.**) and the magnitude of their variation in response to exogenous shocks, respectively **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. However, Wang *et al.* (2006) observe that it is difficult to inform how the non-competitive market price transmission elasticity behaves compared to the competitive benchmark without knowing the primary sector supply relation and final sector demand function.

Finally, for convenience, define that **Erro! Fonte de referência não encontrada.**. According to Vickers (2005), this is not a hard assumption to take, because the dominant firms which exercises market power use to operate with mark-up and mark-down close to zero, in their bid for rivalry. Despite that, their sensibility to exogenous supply shocks do not change, what justifies that only mark-up and mark-down deviation measures correct the price transmission elasticity relative to the competitive benchmark. Consequently, the Equation **Erro! Fonte de referência não encontrada.** is now written as

$$\frac{\tau^c}{\tau} = \frac{(1+\mu)}{(1+\delta)} \Rightarrow \begin{cases} > 1, \forall \mu > \delta \\ = 1, \forall \mu = \delta \\ < 1, \forall \mu < \delta \end{cases} \tag{19}$$

This normalization makes evident that the shifting magnitude in price transmission elasticity depends on the relative magnitudes of mark-up and mark-down. I.e., when **Erro! Fonte de referência não encontrada.** there will be under-shifting in the non-competitive price transmission elasticity compared to the competitive benchmark. When **Erro! Fonte de referência não encontrada.**, there will be over-shifting and, last, when **Erro! Fonte de referência não encontrada.** the non-competitive market price transmission elasticity and the competitive one will shift at the same degree.

A priori, it means that the extent of deviation in price transmission in non-competitive markets cannot be unambiguously defined as greater, lesser or equal than the competitive price transmission elasticity. Moreover, as Wang et al. (2006), we proved that the non-constant returns to scale make difficult this analysis, because setting an increasing return to scale, market power can raise

the price transmission degree, whereas there are instances when this framework can result in the market power contain the return to scale effect at price transmission.

Likewise, setting decreasing returns to scale and market power, occasionally it may result in price transmission degree diminishing either compensate themselves, such that the price transmission degree extent of deviation becomes null.

4.6 – The Necessity Goods Market Behaviour:

To find some concordance between the model presented in this study and the empirical development in the market power and price transmission literature, note that the key to understand the findings of Azzam and Pagoulatos (1990), Sexton and Zhang (2001), Kaiser and Suzuki (2006), Parsons and Vanssay (2013) and Dowbor (2014) is that they applied some NEIO method to evaluate market power concentration at necessary goods markets.

In that case, following Saxon and Zhang (2001), seems accurate to define in an intermediate industry with constant returns to scale technology, an inelastic final product demand function and an elastic supply relation in the primary market. There are many producers in primary market and a large number of consumers in the final market. The intermediate industry buys a homogeneous necessary good to sell at the final market and there are a limited number of firms operating in this industry. This framework describes an oligopsony in the primary market and an oligopoly in the final market, according Weldegebriel (2004).

About the extent of deviation in the mark-up and in mark-down measure in response to an exogenous supply shock, it is likely assuming that **Erro! Fonte de referência não encontrada.**. It means that at a necessary goods market setting, the primary producers' power of price negotiation is smaller than the consumers' price bargaining power. Thus, by the Equation **Erro! Fonte de referência não encontrada.**, we have:

$$\forall \mu < \delta \Rightarrow \frac{\tau^c}{\tau} < 1 \Leftrightarrow \tau > 1 \qquad (20)$$

To Dowbor (2014) it occurs because consumers can choose substitute goods for consumption, while producers, predominantly those ones producing in non-stock goods markets, need to sell their output to obtain earnings and consequently pay its costs. In that sense, despite the Weldegebriel (2004)

and Wang *et al.* (2006) finding that, relative to the competitive benchmark, there is no unambiguous determination to the extent of deviation in price transmission in response to market power concentration, we demonstrate that to necessary goods markets the price transmission elasticity is necessarily greater than the competitive one. Ergo, the intermediate producer looks to over-shift the prices at the final market in response to any price disturbance at the primary market.

Chapter V – Econometric Model:

5.1 – Asymmetric Price Transmission Basic Estimation Modelling:

Peltzman (2000) and Vavra and Goodwin (2005) explain that further than analyze and classify the price transmission symmetry and define what are the main issues who causes asymmetric transmission, the literature has a challenge to estimate and develop tests to verify the existence of asymmetric price transmission and its extent. In this sense, to find a better fit to modelling price transmission at the intermediate industry standpoint, we first discuss the main methods of price transmission and their relation to the empirical framework presented in this study previous chapters.

The literature considers this estimation type mainly to observe vertical price transmission. In this sense, Meyer and von Cramon-Taubadel (2004) points out that several studies use that modelling to estimate financial products, interest rate transmission, exchange and purchase power parity, agricultural and livestock price transmission, energy transformation, gasoline, inputs and output in sugar and alcohol market, without loss of generality.

In that sense, to elaborate a consistent model to analyse vertical price transmission symmetry, we chose to follow Meyer and von Cramon-Taubadel (2004) and Vavra and Goodwin (2005) to estimate the vertical price transmission, considering its classification in order to evaluate market power and/or menu costs adjustment. The main contribution to this methodology is the adjustment to a non-competitive intermediate industry standpoint looking to observe if its position at the market structure is privileged, what may lead to market power concentration, causing market net surplus losses, through price control.

Assuming a symmetric and linear vertical price transmission, Meyer and von Cramon-Taubadel (2004) assume the Equation **Erro! Fonte de referência não encontrada.**??? since **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** denote the autonomous transmission, the price transmission elasticity and the random error term associated, respectively, with **Erro! Fonte de referência não encontrada.**.

$$p_t = \tau_0 + \tau r_t + \xi_t \qquad (21)$$

The Equation **Erro! Fonte de referência não encontrada.** is an econometric model to predict the explained variable **Erro! Fonte de referência não encontrada.**, given a set of explanatory variables **Erro! Fonte de referência não encontrada.**. Hayashi (2000) demonstrates that, **Erro! Fonte de referência não encontrada.** conditional expectation is given by **Erro! Fonte de referência não encontrada.**. Then, rearranging the Equation **Erro! Fonte de referência não encontrada.**, is easy to observe that **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, which ensures that **Erro! Fonte de referência não encontrada.**. In addition, cases when **Erro! Fonte de referência não encontrada.** denotes the matrix **Erro! Fonte de referência não encontrada.**, it is easy to prove that **Erro! Fonte de referência não encontrada.** (Durrett, 2010).

Thereby, Maddala (1977) demonstrate that, since **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, estimate the better fit to **Erro! Fonte de referência não encontrada.** represents the same result of estimate the **Erro! Fonte de referência não encontrada.**. Pursuant to, if this structure holds, it follows the classic parametric model enunciated from the least squares principle by Karl Friedrich Gauss, according Memoria (2004).

Besides that, Greene (2005) proves that this structure also hold when **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. In this sense, according Peltzman (2000), rather than assuming a constant absolute margin, it assumes a relative constant. Despite that, the parameter analysis must be careful because **Erro! Fonte de referência não encontrada.** will reflect the sensitiveness degree of **Erro! Fonte de referência não encontrada.** to **Erro! Fonte de referência não encontrada.** changes, i.e. the relative change in **Erro! Fonte de referência não encontrada.** to relative shocks in **Erro! Fonte de referência não encontrada.** (Gujarati and Porter, 2011). Regardless of, it should be noted that, when this logarithmic framework holds, the primitive function is given by:

$$P_t = A_0 \Xi_t R_t^\tau \qquad (22)$$

where **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**.

A priori, once we are studying the vertical price transmission, this logarithm transformation seem suitable to the theoretical framework presented at chapter **Erro! Fonte de referência não encontrada.**. Hence, by definition, **Erro! Fonte de referência não encontrada.**

performs the price transmission elasticity, following the Equation **Erro! Fonte de referência não encontrada.**.

From Peltzman (2000) study and with a few algebraic manipulations, it is observed that the price transmission elasticity converges almost surely to the least squares estimator. In addition, Casella and Berger (2002) and Bierens (2005) postulates that if an estimator converges almost surely to another, then it also converges in probabilities to that parameter. I.e. to a sufficiently smaller **Erro! Fonte de referência não encontrada.**, it follows that[47].

$$\text{\textbf{Erro! Fonte de referência não encontrada.}} \tag{23}$$

5.2 – Vertical Price Transmission Asymmetry by the Signal:

To observe and classify the price transmission by the signal, the equation **Erro! Fonte de referência não encontrada.** may assume the configuration of Equation **Erro! Fonte de referência não encontrada.**, following Tweeten and Quance (1969):

$$p_t = \tau_0 + \tau^+ D_t^+ r_t + \tau^- D_t^- r_t + \xi_t \tag{24}$$

where the dummy variable **Erro! Fonte de referência não encontrada.**,**Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, otherwise; **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**, otherwise. These dummy variables technique splits the input price in two variables, one that only considers the effect of increases at retail prices, **Erro! Fonte de referência não encontrada.**, the last one who only accounts the effects of decreasing shocks at retail prices. I.e. it makes possible to compare the vertical price transmission elasticity of positive and negative shifts at wholesale in order to observe the price transmission symmetry by the signal.

Meyer *et* von Cramon-Taubadel (2004) point that the symmetric price transmission hypothesis is rejected if **Erro! Fonte de referência não encontrada.** and they are both statistically significant. To Greene (2005), the **Erro! Fonte de referência não encontrada.**-test is sufficient to

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[47] GREENE (2012) 7° ed. P. 1067 et ss.

evaluate whether the parameters are statistical different from each other. On the other hand, each parameter's individual significance is measured by the **Erro! Fonte de referência não encontrada.**-value.

The implicit concept at Equation **Erro! Fonte de referência não encontrada.** pervades the notion of irreversibility enunciated by Marshal (1936) and applied by Farrell (1951) to estimate irreversible demand functions. On the other hand, Tweeten *et* Quance (1969) used this concept to estimate irreversible supply function.

The model of Tweeten *et* Quance (1969) includes the asymmetric price transmission classification by signal, but the literature found problems in its specification whose result in non-constant intercept and biased price transmission elasticities. Then Wolffram (1971) sought to solve these problems by taking the first differences of input prices and by recursive sums of those input price changes which have the same signal, as shown in Equation **Erro! Fonte de referência não encontrada.**:

$$p_t = \tau_0 + \tau^+ \left(r_0 + \sum_{t=1}^{T} D_t^+ \Delta r_t \right) + \tau^- \left(r_0 + \sum_{t=1}^{T} D_t^- \Delta r_t \right) + \xi_t \qquad (25)$$

Observe that, in cases of vertical price transmission, **Erro! Fonte de referência não encontrada.** denotes the initial wholesale price and **Erro! Fonte de referência não encontrada.** indicates the first difference operator. Despite that, Houck (1977) proposes a new elaboration to Equation **Erro! Fonte de referência não encontrada.**, which does not take the initial observations, since its relevance in the explanatory power of price transmission is overestimated, then it may lead to biased statistics to price transmission elasticities. Besides that, Houck (1977) specifies the explained variable as the total difference of output prices, that is **Erro! Fonte de referência não encontrada.**. The Equation **Erro! Fonte de referência não encontrada.** shows this simplification:

$$p_t - p_{0,t} = \tau_0 t + \tau^+ \sum_{t=1}^{T} D_t^+ \Delta r_t + \tau^- \sum_{t=1}^{T} D_t^- \Delta r_t + \xi_t \qquad (26)$$

Moreover, Meyer and von Cramon-Taubadel (2004) points out that Houck also suggests a specification that includes the first differences to final prices and the random error term **Erro! Fonte de referência não encontrada.** is defined by **Erro! Fonte de referência não encontrada.**. However, it does not comprise the same-sign shocks recursive sums.

$$\Delta p_t = \tau_0 + \tau^+ D^+ \Delta r_t + \tau^- D^- \Delta r_t + \zeta_t \qquad (27)$$

Furthermore, note that Equation **Erro! Fonte de referência não encontrada.** is the clearly a summation of Equation **Erro! Fonte de referência não encontrada.**. In this sense, it carries an implicit non-zero hypothesis to the independent term, which implies in presence of trend in Equation **Erro! Fonte de referência não encontrada.** (Meyer and von Cramon-Taubadel, 2004). Notwithstanding, Mohanty *et al.* (1995) studied the price transmission in a spatial context and also do not specifies the presence of trend in that case.

5.3 – Vertical Price Transmission Asymmetry by the Adjustment:

The model presented above explores the price transmission effect according the wholesale shock signal. However, to study the industry is necessary considering the prices at the primary and a final market relating themselves in time. Vavra *et* Goodwin (2005) shows that price shocks may be asymmetric in its speed and magnitude and their adjustment along the productive chain can differ depending on the shock direction.

Recalling the Graph 21 and following, at Chapter 4, it may have noticed the adjustment at final prices **Erro! Fonte de referência não encontrada.** in case of any price shocks at primary market **Erro! Fonte de referência não encontrada.**, under perfect price transmission hypothesis. Observe that, when perfect price transmission holds, the magnitude of retail prices shifting equals to the wholesale prices shock and both the adjustment speeds are simultaneous.

Once the effect between **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** shows how imperfect is the price transmission in the intermediary industry, the perfect price transmission in the Figure **Erro! Fonte de referência não encontrada.** equals to **Erro! Fonte de referência não encontrada.**. In this sense, there is no empirical evidence of price controlling or earnings concentration by the middle industry. In that case, the competitive setting holds and, the price transmission ratio is total, i.e., **Erro! Fonte de referência não encontrada.**.

Before studying the price transmission elasticity, recall the Equation **Erro! Fonte de referência não encontrada.** and assume time dependence on the prices **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.** and on the exogenous supply shocks

Erro! Fonte de referência não encontrada.. Now, following in Hariki *et* Abdounur (1999) and Bierens (2005), by the chain rule and by the natural logarithm asymptotical proprieties, we may represent the price transmission elasticity by:

$$\tau = \left(\frac{d\ln P}{dt}\frac{dt}{d\ln Z}\right)\left(\frac{dt}{d\ln R}\frac{d\ln Z}{dt}\right) = \frac{d\ln P}{d\ln R} \approx \frac{dP}{dR}\frac{\bar{R}}{\bar{P}} \qquad (28)$$

Now, according to Chiang and Wainwright (2005) the discrete representation of **Erro! Fonte de referência não encontrada.** shall approximate the following representation:

$$\tau \approx \frac{dP}{dR}\frac{\bar{R}}{\bar{P}} \xrightarrow{t\sim\mathbb{N}_0^T} \frac{\Delta P}{\Delta R}\frac{\bar{R}}{\bar{P}} = \frac{\Delta P}{\Delta Z}\frac{\Delta Z}{\Delta R}\frac{\bar{R}}{\bar{P}} \qquad (29)$$

Thus, an input price shock in one period may imply in a non-instantaneous response in the final market price. Besides, the final market price adjustment in response to a primary market price shifting may not occur at the same ratio and the final adjustment size depends on the market power of the intermediary industry in the primary market as well in the wholesale market.

The development from Tweeten *et* Quance (1969) until Houck (1977) studied vertical price transmission analysed only by the signal criterion. Therefore, the adjustment criteria remained neglected until Ward (1982) extend Houck model including lags to the input prices. Despite that, the literature in price transmission shows that only from Boyd *et* Brorsen (1988) study the length analysis to differentiate the magnitude and the speed of price transmission.

$$p_t - p_{0,t} = \tau_0 t + \sum_{j=1}^{K}\left(\tau_j^+ \sum_{t=1}^{T} D^+ \Delta r_{t-j+1}\right) + \sum_{j=1}^{L}\left(\tau_j^- \sum_{t=1}^{T} D^- \Delta r_{t-j+1}\right) + \xi_t \quad (31)$$

$$\Delta p_t = \tau_0 t + \sum_{j=1}^{K}\left(\tau_j^+ \sum_{t=1}^{T} D^+ \Delta r_{t-j+1}\right) + \sum_{j=1}^{L}\left(\tau_j^- \sum_{t=1}^{T} D^- \Delta r_{t-j+1}\right) + \xi_t \quad (32)$$

The Ward (1982) model is presented in Equations **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. Boyd and Brorsen (1998) analyze the speed of vertical price transmission by comparing the individual **Erro! Fonte de referência não encontrada.** coefficients and evaluated the magnitude of vertical price transmission by comparing the sums of these coefficients.

Furthermore, is noteworthy to mention that **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** in Equations **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** denote the lags-lengths of positive and negative shocks at input prices, respectively. To Meyer and von Cramon-Taubadel (2004) there is no

reason to these lag-lengths be equal between themselves, *a priori*. Besides that, Tirole (2004) demonstrates that positive vertical transmission use to occur more rapidly and in greater magnitude than the negative ones.

5.4 – Vector Error Correction Model:

Granger *et* Newbold (1974) stated that very often regressions between non-stationary time series variables produce spuriously significant results suggesting that the variables are related when they are, in fact, not related. Although the model in section **Erro! Fonte de referência não encontrada.** attempts to estimate price transmission and study its classification, in practice all those specifications failed to present robust estimators. To Meyer *et* von Cramon-Taubadel (2004) it occurs because those models do not consider the presence of cointegration between output prices and input prices.

Therefore, since our model requires two series individually integrated [48] and, the Simultaneous Equations Method tested before resulted ambiguous, we decided to follow Meyer *et* von Cramon-Taubadel. We proceeded to the use of co-integration model, because what we need in order to test our hypothesis is proving a linear combination of the variables (**Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**), which would confirm that the there is a coefficients between them. The following step is proving that this liaison is endogenous, characterizing the oligopsonistic power artificially altering entry and final prices, which is the core of this thesis.

In addiction, the co-integration model can show a stationary linear combination, for instance, which is already enough to infer that entry price and final prices are associated through time, testing the hypothesis that there is a statistically significant connection between them. Inference could be done by testing for the existence of a co-integrated combination of the two series in time.

There are another several non-stationary and co-integration tests and, von Cramon-Taubadel and Fahlbush (1994) sought to include the co-integration idea to price transmission estimation, based on the findings of Engle *et* Granger (1987). They suggest that the models in Equations **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não**

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[48] in the time series sense

encontrada.,Erro! Fonte de referência não encontrada. and**Erro! Fonte de referência não encontrada.** may present non-stationarity inputs and outputs which may produce unrealistic price transmission estimates between wholesale and retail prices. On the other hand, since von Cramon-Taubadel and Fahlbush (1994) observed this theoretical gap at those former models and begun to consider that to include an Error Correction Term (ECT), whose notation seeks to measure to the extent of error correction for both positive and negative shocks on the wholesale price.

Therefore, this approach seeks to estimate

$$\Delta p_t = \tau_0 + \sum_{j=1}^{K} \tau_j D \Delta r_{t-j+1} + \kappa^+ Q_{t-1}^+ + \kappa^- Q_{t-1}^- + \zeta_t \qquad (33)$$

Where, to vertical asymmetric price transmission, **Erro! Fonte de referência não encontrada.** is the ECT to positive wholesale prices shifting and, **Erro! Fonte de referência não encontrada.** denotes the Error Correction term only to negative shocks at wholesale prices.

Meyer *et* von Cramon-Taubadel (2004) describes this ECT like the Equation **Erro! Fonte de referência não encontrada.** lagged residuals. Hence, **Erro! Fonte de referência não encontrada.** measures the deviations from the long-run equilibrium between the wholesale and retail prices, in the case of vertical price transmission. To a better understand about that, assume a vector **Erro! Fonte de referência não encontrada.**, **Erro! Fonte de referência não encontrada.**. Then, by Engle and Granger (1987), if all elements of **Erro! Fonte de referência não encontrada.** are integrated at degree **Erro! Fonte de referência não encontrada.**, that is, if each **Erro! Fonte de referência não encontrada.** is **Erro! Fonte de referência não encontrada.**; and there is a non-zero vector **Erro! Fonte de referência não encontrada.**, such that, according to Bueno (2008), follows:

$$Q_t = X_t' \omega \sim \mathrm{I}(d - b), b > 0 \qquad (34)$$

Where **Erro! Fonte de referência não encontrada.** expresses the **Erro! Fonte de referência não encontrada.**-th coordinate residue in the vector **Erro! Fonte de referência não encontrada.**, and **Erro! Fonte de referência não encontrada.** is the co-integration vector. Then, if it holds, the elements of **Erro! Fonte de referência não encontrada.** are integrated at **Erro! Fonte de referência não encontrada.** degree and denoted by **Erro! Fonte de referência não encontrada.**.

Despite this hypothesis being too restrictive, it is important to observe that the **Erro! Fonte de referência não encontrada.** contents comprise the long run equilibrium relationship (Bueno, 2008). Hansen (2016) makes clear that, once these variables are non-stationaries, they have a

stochastic trend. Moreover, if there is a common stochastic trend to all variables in **Erro! Fonte de referência não encontrada.**, Engle and Granger (1987) propose that there is a long run equilibrium. It is important to point it out that Bueno (2008) and Greene (2012) suggest the long term equilibria formal notation by **Erro! Fonte de referência não encontrada.**, what implies that **Erro! Fonte de referência não encontrada.** defines a linear combination to **Erro! Fonte de referência não encontrada.** variables, such that it respects a common trend, without any deviation. Nevertheless, at short run there will be deviations from the long run trend. We note that, in this case, **Erro! Fonte de referência não encontrada.** will be non-zero – because, **Erro! Fonte de referência não encontrada.** use to be normalized.

Von Cramon-Taubadel and Loy (1996) extend von Cramon-Taubadel and Fahlbush (1994) model by splitting the input prices using Wolffram (1971) technique, aiming to classify the price transmission according its signal. Besides, their model comprises the price transmission asymmetry classification by the adjustment. Equation **Erro! Fonte de referência não encontrada.** embodies this approach.

$$\Delta p_t = \tau_0 + \sum_{j=1}^{K} \tau_j^+ D^+ \Delta r_{t-j+1} + \sum_{j=1}^{L} \tau_j^- D^- \Delta r_{t-j+1} + \kappa^+ Q_{t-1}^+ + \kappa^- Q_{t-1}^- + \zeta_t \quad (35)$$

Meyer and von Cramon-Taubadel (2004) and Vavra and Goodwin (2005) highlight that the approaches in Equation **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** may fit to both spatial and vertical transmission. In fact, as von Cramon-Taubadel and Fahlbush (1994) estimated vertical price transmission by means of the Equation **Erro! Fonte de referência não encontrada.**, von Cramon-Taubadel and Loy (1996) used the model in Equation **Erro! Fonte de referência não encontrada.** to estimate spatial price transmission.

Now, once this model setting brings these characteristics, and considering this approach seeks to observe price transmission asymmetric behaviour by the signal and by the adjustment, it may lead to consider that: "despite this study aims to estimate vertical price transmission, the described approach shall estimate any type of price transmission without any loss of generality." (Meyer and von Cramon-Taubadel, 2004; Vavra and Goodwin, 2005. Hansen, 2016).

5.5 – Threshold Error Corrector Model:

One of the major problems we had with the previous methodology we have tried, Simultaneous Equations Method, was the incapability of the system to identify and express its outliers. The extension of threshold models, however, is largely a matter. It is probably the most common estimation procedure used in the applied literature.

The challenge that we faced was estimating the values of the thresholds that separate the outcomes of oligopsonistic market power to the regular ups and downs due the interaction between supply and demand forces (+) exogenous facts, seen that the sum of squares function is discontinuous and non-differentiable with respect to these parameters.

Meyer *et* von Cramon-Taubadel (2004) have introduced threshold co-integration which allows non-stationary variables to be modelled in such a framework. The idea is intuitively appealing and fit in the expected general microeconomics theory where we based our hypothetical model because costs of adjustment may prevent the restoration of equilibrium in a variety of economic circumstances, include those for oligopsonistic settings.

The assemblage can be summarised as follows:

$$p_t = \begin{cases} \tau_{0,1} + \sum_{j=1}^{K} \tau_j \Delta r_{t-j+1} + \kappa_1 Q + \zeta_t, & if \ Q_{t-1} < c_1 \\ \tau_{0,2} + \sum_{j=1}^{K} \tau_j \Delta r_{t-j+1} + \kappa_2 Q + \zeta_t, & if \ Q_{t-1} \le c_2 \qquad (36) \\ \tau_{0,3} + \sum_{j=1}^{K} \tau_j \Delta r_{t-j+1} + \kappa_3 Q + \zeta_t, & if \ Q_{t-1} > c_3 \end{cases}$$

We aimed in this work to study the imperfect price transmission in the intermediate industry resulting by oligopsonistic market power. The major conclusion is that: despite the general framework leads to an inconclusive determination of price transmission extent of deviation relative to a competitive benchmark, we can demonstrate that, in a necessity goods market setting, the static intermediary industry price transmission exercises oligopsonistic market power.

Moreover, is noteworthy to mention that the mark-up deviation measure in response to an exogenous supply change at the oligopoly is strictly lesser than the mark-down deviation measure in response to an exogenous supply change at the oligopsony. It implies that the intermediate industry oligopsonistic power on the primary suppliers' is necessarily greater than their oligopolistic power on the consumers' demand. Under these circumstances, this means that, while consumers have a slight bargaining power with intermediaries, since they can choose to reduce their consumption, or even choose to consume substitute goods, the producers did not have the same negotiation power; in

refusing to sell their output to intermediaries, they may incur in economic losses, especially in cases of production of non-stock assets.

Chapter VI – Error Analysis and Exclusions of Antithetic Hypothesis:

6.1 – Inapplicability of Simultaneous Equations Model:

The first hypothesis tested (and discarded) for our model was Simultaneous Equations Method (SEM)[49]. Examining the literature, several studies have shown that this method is accurate enough to reach stable conclusions as long as variables are known and estimated, however these conditions are knotty to reach in oligopsonistic markets. We realized that the outcomes ended-up drawing a graphic system of price variations which measures less accurately than the cointegration model, even when it is geared toward an analysis of the two behaviours separately.

In oligopsonistic settings, the supply function describes individual behaviour and it is derived from basic economic principles of individual utility maximization, since production is made by small firms aiming big intermediate companies. Holding other factors fixed, demand function did not give us any potential conclusion facing the changing in final prices.

When an equation has economic meaning in isolation from the other equations in the system, we say that the equation is autonomous. One way to think about autonomy is in terms of counter-factual reasoning, as in the parametric quantity of the supply function, then, for any individual firm in supply market. We can find its demeanour given any value of the potential quantities and prices of the other observed and unobserved factors that leads middlemen to take their price policy. In other words, we could, in principle, use the SEM in order to trace out the supply function for given levels of observed variables in cartel settings, but the outcome could represent a mere relationship and not a causality closely tied to the middlemen's demand.

Therefore, since we are interested in each of the explanatory variables which causes the massive profit variations in oligopsonistic markets, including any that are endogenous, SEM would not underline conditional expectation that has a causal structure. In the supply example, if we could run a controlled experiment (which obviously is not possible), where we exogenously control

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[49] SEM is also the acronym for Structural Equation Modelling, which is a different set of econometric methods that is commonly used in the social sciences due its ability to impute relationships between conceptions hardly measurable, such as fear, reliability, hope, etc. from observable variables mathematically expressed. We also use it in this thesis, however we did it sporadically, thus we prefer to use the whole name in order to not confuse with other Simultaneous Equations Models.

demand, then the supply function could be estimated without ever considering the final prices function. In fact, in the absence of stochastic variables or measurement error, Simultaneous Equations would be an appropriate estimation method. However, in cartel markets, regardless of the level of aggregation, missing information and aleatory variables are the rule, not the exception, and Simultaneous Equations was originally developed for applications where two or more variables are known and analysed together.

Considering that final consumer's choice in a microeconomic theory can be derived from utility maximization, for simplicity, supposing it is only between: "buy" or "do not buy"; the factors assumed to be exogenous to the individual's choice are variables like price, substitute goods, incomes sources and so on. So, the utility function will depend only on two structural equations over the individual's optimization problem.

Of course, it is always possible that factors such as population, income, wages, unemployment rate, etc. are treated as exogenous by the econometricians and so correlate them with the observable factors, notwithstanding, measurement error is rather more complex to achieve accurately, since omitted variables are not considered. So, the outcomes that we got from using SEM to attach final and intermediate prices in a oligopsonistic panel did not solve completely the template or led us to circumvent microeconomic theory with non-sense results.

The first equation would describe entry prices in terms of the what was paid by middlemen (+) exogenous factors, while the second one would have final prices as a function of consumer choice (+) exogenous factors. Although it is possible to write the first-order-condition for an optimization of the problem, we have gotten, as result, a non-causal interpretation.

So, what would it mean to study the effect of changing the entry prices comparing to final prices without a causality between them? It would be more adequate using a basic microeconomic reasoning, that, once entry prices fall, final prices would equally fall, and the same logic for when they raise. But, as we showed in ch. II, although it is logical, it is not factual in oligopsonistic settings.

So, counting on the expertise of the co-director of this thesis, Moro, we decided that, with a subtle adjust in time spent in both activities (effect / consequence) cointegration is much more accurate in determining how one endogenous choice variable trades against another, since our is to infer causality.

Biddle *et* Hamermesh (1990) run an cointegration model controlling some variables particularly hard to handle such as demographic and health factors. At the end of their research, they recognized that in analyses which depend on individual or small group of people's choice is possible to establish a bias as a result of a co-integration framework. In fact, when the choice depend on an

individual or a restrict group, which is the case of oligopsonistic market, the outcome is largely arbitrary. Biddle and Hamermesh (1990) also derived a model using Simultaneous Equations of demand along with a supply function, where a key explanatory variable would be not demand or supply but the interaction between them. The results were not conclusive.

So, in order to avoid deceits that simultaneous equations method could bring for our hypothesis, we decided to use asymmetric transmission estimation with co-integration and threshold error corrector model.

6.2 – Quantity Counter Trend Paradox:

In competitive markets, Giffen goods are supposed to behave in the opposite way of general goods: demand rises when prices rise and demand falls when prices fall. A Giffen good has an upward-sloping demand curve towards price, which is contrary to the fundamental law of offer and demand in microeconomics which results in a downward slope for the demand curve as result of demand towards a minor price.

Of course these behaviours are only valid in a very particular state of affairs, since Giffen goods are quite rare, given the general conditions which are necessary to the phenomenon comes up; as explained in the previous section, it is possible to assume that Giffen goods are always local, necessary, inferior and they do not have easily available substitutes. Moreover, it is necessary a market where consumers have strong budget restrictions and the good is responsible for considerable portion of their incomes, however there is another sort of goods which have opposite characteristics but the same graphic outcomes.

Although this second hypothesis is very rare and the theoretical restrictions necessary are also significant, it occurs in marginal cases in real markets, and their review, even if briefly, is necessary since this research is a doctoral thesis, methodologically theoretical, and it is imperative that every single antithetical hypothesis is dismissed in order to prove the existence of oligopsonistic cartel in action.

So, there is another possibility where demand does not follow the general rule, generating a paradox explained by the same the theory of Giffen good but with a different approach. Since general Giffen theory is applied to inferior goods which have negative income effect large

enough to outweigh the substitution effect, for high superior goods who performer the same way must have a distinct explanation.

Actually, there is a very specific niche of market for superfluous goods bought for super rich consumers, where the main motivation to buy is the social status of buying it rather than its intrinsic utility.

Unlikely of the general theory of Giffen goods, income effect is null. Only few consumer with properties, assets, incomings and patrimony large enough to not depending of wage levels have access of this market. On these settings, high superior goods have their consumption reduced when price falls and limited increase when price rises.

Although, at first sight, it can appear the same effect of oligopsonistic actions, the motivation is totally different. Elite[50] consumers might perceive a price downward trend as a decline in glamour or status, which is substantially, the only reason to buy such good.

Graphically, the demand curve comports as offer one and vice-versa, as follows:

Graph 26 - Oligopsonistic Offer alternative setting:
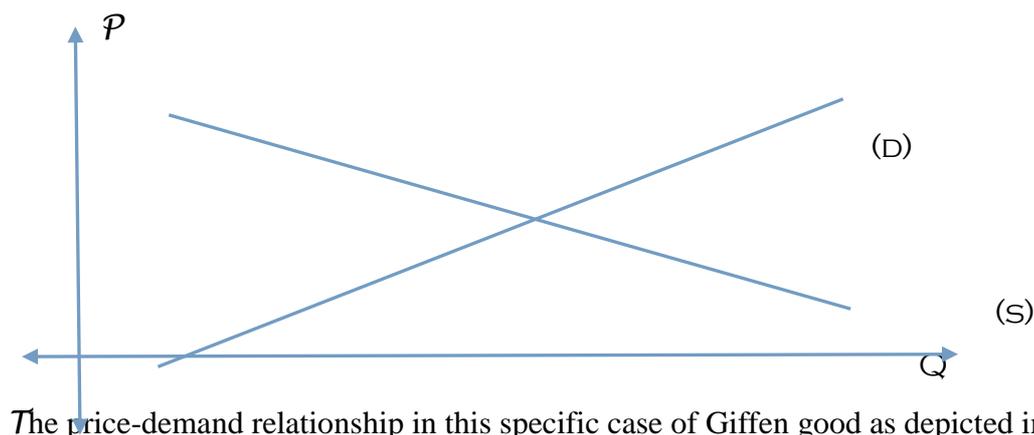
The price-demand relationship in this specific case of Giffen good as depicted in the graphic above shows an inverse trend of the general microeconomic theory; it only happens because the motivation to buy is the contrary of rational stimulus: they buy not because they need that, but for the reason that other people cannot afford it. It seems ridiculous, and it is indeed, but the reason why this sort of microeconomic behaviour, even if it is insignificant in real cases, must be studied is that it can be used for firm's lawyers as a defence theory against oligopsonistic conspiracy accusations since the graphic outcomes and price demeanour are homologous.

It is also important to remark that, even if it is a marginal occurrence, this phenomenon happens only in elite markets for high superior goods which is to say that it always involves large sums of money and, by consequence, considerable quantities of taxes for governments. Therefore, although it is weightless in quantity of cases, it is noteworthy when it comes to taxes policies and

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[50] Elite must be read in the sense of Pareto, for economic purposes only.

economic impact.

The whole issue is that the negative net effect of price over quantity can induce market authorities to think that they are facing a sort of oligopsonistic structure of market, when it is another nature of economic singularity. Therefore, the best to repel this antithetical state is to evaluate which type of good and consumers are behaving like that. According to Giffen, for this fettle comes up it is going to be necessary 2 main characteristics happening together:

a.Consumers = only elite consumers or upper-A class consumers;

b. Goods = High superior goods or Premium goods.

Thereby these 2 occurrences combined can be classified as strong evidence that the anomaly in prices' behaviour surveyed by market authorities is actually a sort of elite consumers behaviour rather than an outcome of oligopsonistic collusion, particularly for the reason that oligopsonistic cartels are more often in inferior goods

Mathematically, for a "X" good, the quantity (Q_X) has a positive correlation with price (P_X) so demand (d) will appear with a downward slope, and bid (s) will have a upward slope. That is the equation which explains the curve behaviour:

$$Q(x) / d = (Px), \text{ assuming cæteris paribus, being } (Px) > 0.$$

With this equation is possible to trace an indifference curve for each level of utility that will reflect the consumers' plan of disbursement on this specific niche which will be represented by several indifference curves for each good. That identifies the various consumer preference scales, and such a set of indifference curves will limit the outermost where consumers are willing to pay. Also, by definition, the indifference curves do not intersect or touch, because it is not rational a consumer achieve uneven levels of satisfaction at the same time spending the same quantity of money.

These characteristics are enough to market authorities differentiate the anomalous elite consumers behaviour from outcomes of oligopsonistic collusions, notwithstanding, some other features can be accentuated such as: in a competitive market equilibrium price emerges spontaneously as a result of supply and demand interacting throughout time, on these markets, prices are fixed by producers much higher than a hypothetical equilibrium, and it tends to remain no matter how vivid variations in demand come up;

Another point is, when the price is below the fixed one there is no excess of demand. Consumer fidelity is high as long as producers do not betray them decreasing prices. It may sound strange, and it is indeed. Publicity cannot be direct and never focus on price. Post-purchase services are especially important for products that are expensive, and the simple existence of it is a trace that this phenomenon is not an oligopsonistic collusion.

Another remarkable characteristic is that when there is excess of demand, consumers are willing to pay an even higher price for the product, so the price of product increases normally, but the opposed effect does not occur. Thus, when the quantity demanded for this sort of goods decreases, prices decrease but only until the original level, where they block. If producers follow the general rule of economics and reduce the price under the "status limit", so this good will experience a more than proportional decrease in demand.

The explanation is that the new price does not add new consumers but distance the captive ones. The balance on this market will not be established in the most appropriate point for both sides (producers and consumers), amount produced and an equilibrium price are note related because consumers are willing to pay not only for the good itself but for exclusivity and status. These two variables are the main ones which must be proofed by companies' lawyers to dismissed any possibility of an oligopsonistic cartel collusion manipulating prices.

6.3 – Middlemen Decrease in Marginal Profit:

One of the most important methods is providing an utility for marginal revenue comparing 2 goods (X_1 ; X_2), supposing that X_1 is superior and X_2 is inferior; if demand is elastic and marginal revenue is positive so the price of the goods are reduced; elastic demand gives us surety that a rise in the revenue is redirected from X_2 to X_1, therefore the lower price and the change in the (∂) ratio are reinforcing: marginal revenue falls since the price falls and because marginal revenue is a smaller portion of the price. Marginal revenue may be upward sloping only if one or both preference elasticities decline in value indicating that the two goods become closer substitutes at lower prices.

Another benefit of applying Common Utility Functions is that the preference elasticity approach is facilitated because most of them are built up from functions like Cobb-Douglas, where:

$$U = X_1^{\alpha} . X_2^{\alpha-1} \qquad \blacktriangleright \qquad f = \alpha / 1 - \alpha \quad . \quad X_2 / X_1$$

Seen that, we can simplify the analysis of several real cases when movements are out of the expected trend. Outcomes will give us a figure whether it is a result of Giffen theory or not. The preference elasticities can show whether the utility is homothetic. In that case, goods must be normal and marginal revenue is positive implying that price declines and marginal revenue is a smaller fraction of a declining price.

It is also possible to assume that: if marginal revenue is positive it is downward sloping, and if marginal revenue is negative, it is upward sloping. Both of these utility functions may be adapted for essential goods by adding a minimum requirement and this will make the utility functions non-homothetic.

Mathematically, taking γ_i as shift parameter for the utility function of (X_1) we can say that typically for a minimum requirement ($\gamma_i > 0$); comparing elasticity with good (X_2) so we have:

$$U = (X_1 - \gamma_1)^\alpha \cdot (X_2 - \gamma_2)^{\alpha - 1} \quad \text{and}$$

These elasticities are greater than the ones for necessities and consumption is reduced to the subsistence limit, so, for primary products outcomes indicate that they are always inelastic and for Subsistence goods they are completely inelastic.

Expanding this theory for a multiple choice market, where:

$$(X \in \mathbb{R} \mid X \geq 3)$$

It is not necessary a mathematical structure change, an extension to 3 or (+) goods market can be outlined effortlessly: for a comparative static we change the price of one good and hold all the others goods prices constant. Therefore we may construct an aggregate of all other goods and the results extend immediately adding a summation at the method:

$$\gamma = p_1 \, x_1 + {}^n\textstyle\sum_{i=3} \cdot p_i \, x_i$$

With this slightly different approach we extend the range of application of the theorem of price elasticity and gross substitution to any number of goods.

On that situation, demand is elastic if and only if other goods are on average gross substitutes, with income shares providing the weights for the average. The reason for the result is straightforward. If demand is elastic, then a price augment results in more than proportionate decline in the use of the good releasing income for other goods whose demand have to rise.

Preference elasticities are the keys that link substitutes, complements, needs, wants, desires, income effects, demand elasticity and marginal revenue together. Elasticities greater than 1 implies that the marginal rate of substitution is changing quickly enough. In this scenario, the indifference curve will not cross the axis and utility is undefined unless the good is consumed. This is the accepted definition of "necessity". The same quick change in the slope of the indifference curve indicates that a higher price of the good will draw income from the other good and reduce the quantity demanded, which is basically the definition of a gross complement. Those necessities, unsurprisingly, should be complementary and essential for positive utility.

This conclusion also allows us to better understand suppliers' behaviour in oligopsonistic

environment. Very often cartels consider supplier (A) as gross substitute of (B), but the vice-versa is false. This is a complex paradigm in microeconomics which we are not fully answered on this thesis since this is not the topic, but a shallow explanation is enough to provide an extra support to the final conclusions on this work.

In oligopolistic background, mathematically, this situation shows us that product (B) has a higher income affect than product (A), or in other words, (A) is a necessity and (B) is a desire, this provides a natural explanation: (A) satisfies a necessity causing the MRS to change rapidly and as income rises, spending shifts rapidly to (B). A lower price for either good causes a small substitution effect and a large income effect toward (B). A new type of symmetry emerges: the response to either price decline is essentially the same, the quantity demanded of (B) rises as the dominant effect is that income shifts away from the essential.

The core idea extends to any number of goods in a straightforward way. Necessities have inelastic demand because the price must grow more than in proportion to the quantity decline in order for the demand curve to be bounded away from the axis. Therefore revenue is attracted from other goods and necessities are on average gross complements with other goods. Given two goods, higher preference elasticities produce low elasticities of substitution and, adding a necessity reduces elasticities of substitution in larger systems.

In oligopsonistic markets these effects is felt when products are not commodities and it can be felt even if they have only a slight difference between them, and it cannot be considered as a manipulation of market, but a natural consumer phenomenon. On this very case, middlemen are just reassigning consumers' preferences.

In conclusion, the elasticity of the MRS should play a significant role in demand analysis, specially in markets under pressure of oligopsonistic cartels, since that an approach based on needs and wants spotlights a difference between the innate price ups and downs based on offer and demand variations and when it accrues from an exogenous interference.

6.4 – Giffen Theory Unrelatedness:

Giffen theory must be analysed because of the antithetical conclusions that its effect can produce over the hypothesis here sustained. It is clear that Price Elasticity of Demand(PED) is not only a measure of opportunity of consumption of a good or service in a specific market, but also

about the necessity of it; thus, PED allows us to perceive less or more rigidity throughout time than others methods of economic observation and it is particularly important to disclosure the existence of veiled manipulation in an observed market.

So, when a change in prices does not reflect the expected quantity that the elasticity predicted, certainly, the first step is readjusted the equation reassessing the data to reflect the new reality and thus there will not be any fission between theory and practice. Notwithstanding, for the proposal of this research what interests most than adjustments in these equations is the causes why predictable price elasticity of demand does not work in real market scenario of the product or service previously analysed.

Assuming that the data collection was made carefully, which means, excluding the possibility of errors or misinterpretations in the handle of information and calculation of price elasticity of demand, the non-expected moves are due an out of sight forces acting in price policy, thus the difference (Δ) between Expected (ε) and Real (R) prices considering results (X) in module | X |, give us a dimension of the power behind it measured by price variation as the follow equation:

<div align="right">

Eq. 07 - Elasticity comparison:

</div>

$$R - \varepsilon = |\,X\,|$$

The outcome of this equality is a fine indication of free market manipulation, especially in oligopsonistic settings, this comparison can be a very effective mathematical toll to disclose a handling price, because it would be infeasible in ordinary market conditions, where buyers and sellers are price-takers, a variation in prices much further from the original PED, however, demand and price can have the same trend when Giffen effect is present in the market.

Therefore, it is possible to summarize that there is a major likelihood of (Q) not acting as projected in price elasticity of demand results in non-competitive markets or in Giffen markets rather than in free concurrence environment in dynamic models.

However it is a corpulent indication, it cannot be taken as a closing confirmation of market manipulation; it must be examined among other evidences which we will present on this research. PED presents some inconveniences too, one of them is that results are shown in prices values, it is a poor unit to quantify how far from the predicted setting the reality is.

The elasticity equation makes clear that oligopsonistic trusts have an incentive to increase their markup of price over Marginal Cost(MC) when demand becomes more inelastic. Consequently, variables related to market structure may appear in reduced-form price equation because they reflect the extent to which the firms are able to exercise market power. Although Giffen Effect has the same outcome, the reason is completely different, it occurs due a strong relation with income effect outweighing the substitution effect. So in order to move Giffen Effect away from

oligopsonistic outcomes is necessary to analyse consumer's incomes. Elasticity can also helps to answer questions such as whether prices were outliers higher or lower during the period of alleged conspiracy, even when there is no sufficient information to isolate the structure of demand and supply separately.

Of course that behavioural economic theory must be used to assist in the specification of the market structural relationships, but it would be very difficult to arrive to any conclusion about cartel using it alone. Typically, the error is assumed to be independent of, and therefore uncorrelated with, all of the variables such as income and price substitution. For example, an increase in the firms' costs of production not reflected in the included cost variables may cause price to increase, but it is assumed that the resulting price increase will not in turn affect market structure.

Graphically, Giffen effect can be represented in 2 different ways, depending on the situation where the phenomenon happens. On the 1st case and the 2nd one, graphic shows exactly the same picture: an arbitrary constant parametric equation whose the values observed characterizes an metathesis of trend described in general microeconomics theory, i.e., there is a irrational price equation that could lead market authorities to false conclusions about the existence of an oligopsonistic cartel. It is also important to add variables which will prevent mistakes by theoretical restrictions. We indicate 6:

a)sales of substitute products;

b)sales of complementary products;

c)increase or decrease of consumers incomes;

d)analysis whether is a high-order or a low-order good or service;

e) If it comes to seasonal goods or services;

f) Production cost variable

The absence of those analyses above mentioned can bias the results if, for example, costs were higher during those periods of alleged wrongful behaviour because of the influence of variables not included in the model, or if demand grew more inelastic in ways not captured by the included demand-side variables, then an effect of wrongful behaviour might have a large positive coefficient for reasons unrelated to the existence of an artificial Oligopsonistic market.

Moreover, the identification issue relates to whether variations in price and output are due primarily to shifts in supply, demand will not be identified. Without further information that allows the lawyers in antitrust litigation to distinguish demand from supply, no identifications about the nature of the oligopoly or oligopsony are possibles.

On the other hand, having all those variables under control, and assuming a basic

statement that price and output are "endogenous" variables[51,] whose depends directly of offer and demand, identify artificial oligopsonistic markets are not only possible, but also very accurate if the the researcher identify those outliers.

6.5 – Outliers in Edgeworth Box Price Limits:

Edgeworth Box theory[52] provide a great tool to analyze substitution effect in multiple choices entourage. In order to simplify, without losing the theoretical background, we will use a two choices of goods and services baskets, described by (L ; K), graphically represented in 2 dimensional spaces (X ; Y) with 3 different customers in distinct levels of incomings:

$$(X_1, X_2, X_3, ; Y_1, Y_2, Y_3)$$

Where budge restrictions respect the order:

$$X_3 > X_2 > X_1 ; Y_3 > Y_2 > Y1$$

Graphically represented as follows:

Graph 27 - Indifference curves for X budget constraint:

Graph 28 - Indifference curves for Y budget constraint:
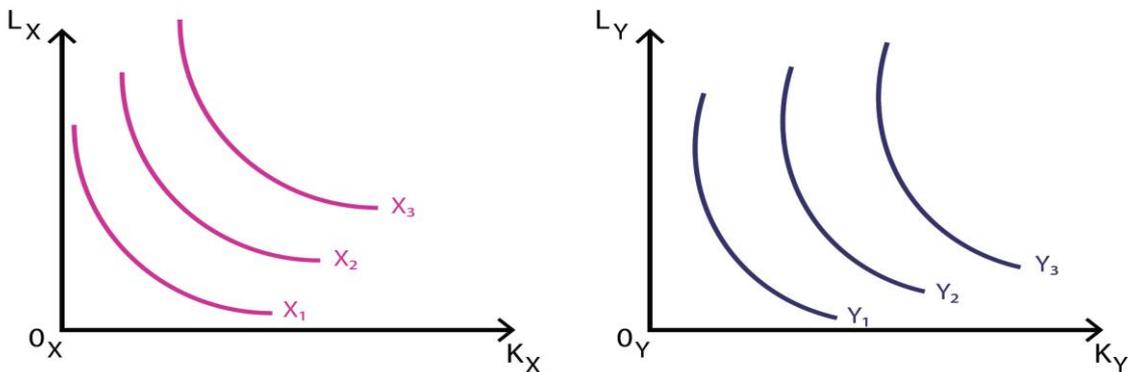
On these 2 graphics drawn above we can observe 3 different curves of Pareto optimal choices[53] between two baskets and 3 budged restrictions. In order to build the behavioural

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[51] i.e., they are jointly determined by the intersection of demand and supply, as a consequence of the presence of an endogenous variable on the right-hand side of a demand equation, ordinary least squares estimation of Equation is likely to yield biased estimates of own- and cross elasticities of demand.

[52] F. Y. Edgeworth is quoted into the Literature Review as a theoretical framework of this thesis, especially because of his publications about price cycles in oligopolistic markets.

[53]   Pareto Optimal choice system will be better studied in the next section of this chapter (5.2)

Edgeworth Box theory we point up a consumer with endowment $\omega \in$ Rn. given a price vector "p", so consumers wealth is:

$$p \; x \; \omega,$$

And so their demand is:

$$D(p) := c(\, p, p \, x \, \omega) \in Rn$$

The offer curve *OC* is defined as the set of demands, as prices vary:

$$OC := \{D(p) : p \in Rn\}$$

Using a 2 goods and services market we have ($n = 2$). The distance from the corner shows us budget restriction: the further the better, which means less restriction. The 2 panels illustrate traditional shape of the OC to a rational consumer with the same basic preferences.

Isolated, the OC of each single consumer does not affect the multiple choices of the other consumer, notwithstanding it can only be considered true neat in markets with no production limits, which is a very strong hypothetical restriction. So, in more realistic cases, as we search in this thesis, the OC has acquired an extra dimension, compared to the one-dimensional curve of a single rational consumer, seen that in real cases the OC is under other consumers' choice influence.

In a scenario where we try to reproduce a mistake bounded market, the real OC is approximately the union of the OC (Traditional version) + Curve of rational producers' decisions (Behavioural Version).

The Edgeworth Box Theory can help us to sustain the internal price cycles showing a more realistic plot inasmuch as agent's offer curve must set demand consumptions [$c(p, p \cdot \omega)$], as the price vector are submit to the market variations, whereas the traditional (rational) agent's offer curve, this important variable, is not properly considered.

In the sparse traditional model, demand [$D(p)$] is not homogeneous, this is actually an elusive proposition, since the offer curve is effectively described by two parameters (p1, p2), rather than *ratio* among them subject to market demand variations, so it is two-dimensional ignoring variations of the others consumers as better explained in General Equilibrium Theory.

For 2 consumers with budged restrictions and 2 commodities only, graphically, the Edgeworth box would show a scenario as follows:
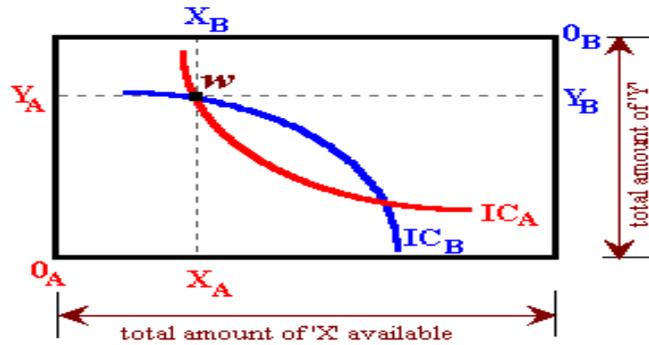
It is possible to conclude that consumer A's choice affects consumer B's decision because of the scarcity. Prices will change not only because of offer x demand interactions but an ampler balance approach: the more A consumes "X", the less it remains to be consumed by B, which pressure "X" prices up and the contrary is also true. These movements of market strengths will result in a more realistic equilibrium than the one which analyze the single insulated market.

On the graphic 29 is possible to observe that indifference curves of the consumers A and B have a double touch. None of them are the best choice for them, hence, offer, demand and consumer's choices tend to adjust to a point that is better for one consumer without being worse for the other. These reciprocal actions influence will result in a more down-to-earth setting.

The outcome of the interaction of these 4 direct forces (1.consumer A demand; 2.consumer B demand; 3.product "X" offer; 4.product "Y" offer;) + 2 sequential forces (1.A's decision over B decison ~ 2.B's decision over A decision) is the F equilibrium point on the Edgeworth box.

However, this scenario, although more realistic than single market analysis, it is still a static reduction model with controlled variables and only 2/2 setting. In real markets however, consumers and commodities (goods or services) -▶ ∞ ; variables are stochastic, parameters are more imprecise and analysis are dynamics.

So, trying to be even more realistic, we can make a parsing throughout time, take 3 different "T's". These multiple-valued functions are fundamental to understand Oligopsonistic markets and their agent's behaviour after producers' reaction. In the traditional model, equilibria are the intersection of offer curves as showed above. Notwithstanding, taking the graphics previously aforementioned and using Edgeworth contrivance in a dynamic model in 3 different "T's" it is

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[54] http://www.digitaleconomist.org/

possible joining the 3 intersection points the following curve: *Graph 30 - Dynamic Edgeworth Box:*
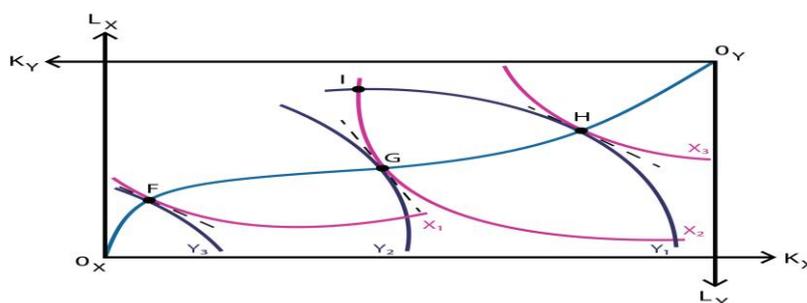
It is important for this research on oligopsonistic cartels behaviour remarking that no matter where the 3 indifference curves are drawn, how far from each other, how concave or straight they are, once superimposed on Edgeworth box they will always have soft N form from the *cordenatio* point of view or a soft Z form from since *ordenatio* axis point of view.

Backing to Pareto optimality, and remembering the central problem of Economics is the scarcity, an optimal allocation of commodities can be determined by the concept of allocation of commodities where it is not possible to make one person better off without making any other person worse off as showed in the graphic above. Taking that for granted, the next step in general equilibrium analysis of dynamic prices policies is how this movement takes place from the initial allocation to a Pareto efficient allotment.

This wave movement is accomplished through the price system where the relative values between middlemen offers and producers demand will establish the quantity of goods "X" or "Y" that will be produced. This equation portrays the terms of trade between the two parts involved in oligopsonistic structure of markets and the slope of any contour passing through the endowment point which represents this price ratio of commodity "X" and commodity "Y" which can be translated to producers' options in oligopsonistic settings.

These both pressures and the instability of dynamic analysis in stochastic surroundings will give the wage form to intermediate profits when they are analyzed throughout time, since the sequential outline is relatively susceptible to changes in hypothetical auction procedure, where different price ratios are called out, and when it reach the top point all the market squeezes for a more competitive equilibrium, which will be established momentary at a point further down, whereas the forces start to act again pressing to a higher point without achieving an stable balance or flat oscillations.

The ups and downs are cyclical and the gap between them are remarkably deep, since the market is under a handmade price policy, and oligopsonistic agents make profit with this instability, even more than in a flat and standard price policy. That is the same logic of stock markets: going up or down is possible to make money, the problem is when market has a flat tendency. This is the main

reason why this problem should be exogenous solved.

6.6 – Labini Deflationary Innovation and Oligopsonistic Compensation:

When markets are under an oligopolistic cartel frame, final prices are expected to rise, giving Markets Authorities traces to prove the existence of a collusion. However, in oligopsonistic structure of markets the situation is rather more complex because final prices do not necessarily rise, making these collusions untraceable. Moreover, a fact that is not frequently mentioned in researches about cartels is the that capitalism economic system is essentially deflationary. The capacity of providing services, producing goods and logistics involved on the process of distributing them grows exponentially with new technologies and techniques.

For these reasons, sometimes final prices are stable not drawing attention to Authorities, notwithstanding they should be decreasing. Cartels are acting not making prices rise but just keeping them at the historical levels and growing their mark-ups, which makes collusions much more difficult to be detected.

Labini (1969) researched this phenomenology emphasizing differences between the pace of technological innovation and general prices level to explain deflationary trends and why prices do not proportionally rise as expected in Cartel settings deceiving Market Authorities. Labini found that cartels are the most common market structure and the prevailing from the twentieth century.

The work of the Italian economist is largely devoted to the study of several arguments and theoretical concepts complementing endogenous genesis of asymmetrical stiffness due the dynamic process of creation of new production techniques. Labini, using kinked demand curve, also states the importance of foreign competition to reduce cartel concentration of power in domestic markets and the role of Authorities to prevent collusions. For the identification of asymmetric dynamics price wave he compared changes in business benefits or mark-ups to the cost variations, emphasizing the asymmetrical link between them. He argues that cost reduction does not result in lower prices but higher profits due to market imperfections.

Labini also made a dynamic explanation of how prices reach the equilibrium in cartels and the Pareto optimum level acceptable to all cartel members. His theory can be fully applied to

Oligopsonistic cartels and the limits to his theory are far from diminish the validity of the overall idea. He considered the premise on the existence of stiffness in cartels, and he summarized as follows: "*technology is an objective and it is fundamental element to the pricing in oligopolies. Transition from small to large firms is not gradual; there are jumps and precisely because of them concentration has an opportunity to proceed*" (1969). The Economist, however, do not criticize technological evolution, he instead assumed that it is the only way to increase productivity; his concerns are about some side effects as the one aforementioned.

The industrial process generates technological discontinuities, in the sense that certain methods and organizational techniques can only be taken by large companies whose benefit from the economies of scales, and per Labini, the structure of an industry is a function of market size, elasticity demand and participation of bidders in sales.

Determining prices depends on a mixture of facts analysed in this research, Labini emphasizes the role of technological progress as one of the most important price determinants, and discontinuities in prices due to technological leaps are far from being an exception, they are spread out as a capitalism characteristic, they are part of the normal course of economic events and they might be understood as such.

Highlighted that the expansion of a company is determined by mainly 3 factors: primarily, the capacity to grow production in scale; secondly the logistics ability to distribute its products to final consumer, and thirdly, and more important than the other 2 summed up: the technological improvements which lead to reductions in production coefficients and shorten the distance between producer and consumer.

On this very point his theory is fully applicable to oligopsonistic outcomes and largely explain some stiffness on prices. The author states that new techniques applied to logistics should generate an overall reduction in final prices, but his empirical observations showed that instead, most likely is that firms incorporate costs reduction and maintain price stable achieving greater profits without rising prices. The lowering of the variable factors of production used by firms of all sizes can cause, under certain circumstances, a decline in market prices proportion. Reducing fixed costs linked to production factors, such as example new plants and machinery used by large companies, does not induce a decline in prices; in the rare cases where there are any reduction, it happens in lower in proportion and not immediately.

Labini stressed that the actions of other 2 important actors: State and Workers' Unions aim to ensure that cost reductions will translate into increases of taxes and wage but not in deflation. The downward inflexibility of prices in a scenario of cost reductions is also caused by technological discontinuities, which means that pace of innovation reach firms in different times. The gap between

the most and the less innovators companies leads not to price reductions of the one which head technological innovations but to increase profits instead. These major profits under oligopoly or oligopsony settings will help the financially stronger agents to dumping the weaker firms in the medium and long terms.

In another turn, the Italian Economist shows that copyrights, patents and royalties can work not as an incentive to innovation, but to concentrate the right to innovate in a few hands and hence the formation of cartels. He has an argument of endogenous inflexibility caused by maleficent regulation of in the characteristics of the process of creation, possession and use of new technologies that can end up in prices stiffness and asymmetric dynamic economic cycles, where he distinguishes short-term stiffness to rigid long term.

Short term rigidity, in turn, can be considered in three ways. The first is the link between the price change and the change in demand, the second sense refers to the relationship between the price change and the change in costs, and the third, to the frequency change in prices.

About the first sense, Labini stresses that, in oligopolistic (or oligopsonistic) markets, a reduction in demand results in an adjustment of the offer rather than down final prices. Only goods produced in perfect competition or perishable ones are subject to a proportional final price downward adjustment caused by their absolute flexibility regarding changes in demand.

The second, and the most important sense of interpretation for this research, is that rigidity is interpreted by Labini, as an outcome of cartel's strategy, preventing a direct correspondence between changes in cost of production and final prices in the short term. These correspondences will be as lower as larger barriers to entry into market are.

The third sense of stiffness is conceived as prices will be stiffer if less frequently they fluctuate. The distinction between short term and long term, far from trivial, can hold one of the core points: there is no competition between generators models inflexibility, but coexistence and complementarity in explaining the phenomenon.

With regard, specifically to the hypothesis of downward inflexibility the most important concept of price stickiness long term rigidity is related to technical progress which can generates concentration since the cost reduction is not transferred to final consumers, being used by firms to increase their benefits. Beyond that, technical progress restrictions access, as described, can be a strong boost to foment collusions and hence inflexibility of prices as an outcome of the structural conditions. Cartels based on control of new technologies are much stronger than the ones based in control of exploration only, enforcing police makers to seek a middle way between copyrights and market competitiveness. However, technology as an endogenous generation of asymmetry implies the need for some unavoidable coexistence with copyrights which involves an effort of multiple

areas of Law & Economics, because once a cartel is structured, Labini assumes that is not feasible to transform a concentrated market into a competitive one without government intervention to lessen their power, suggesting legal regulations, tariffs or other artificial constraints as the best tools to rebuild a competitive scenario.

Labini warns that the transfer of costs to final prices would depend on the exposure of firms to foreign competition where the technological run is under a fierce rivalry and internal laws are confronted with different legislations lessen power of tech barriers to entry of new stage of productions. He observed that when average cost goes down, prices as a rule do not fall in the same proportion, because the most dynamic firms are not compelled by foreign competition to reduce prices, thus they trim down only the extent to which they deem it necessary to prevent the entry of new firms; and since the innovations that they achieved are not reliably protect or accessible to other firms, under these circumstances they can be fairly sure that the rise in profit margins will create no risk of an invasion in their market.

A less foreign competition is a lower incentive for companies to move final prices downward and keep barriers to entry for local firms. He noted that price rigidities and asymmetries has a close link with the critique of economic orthodoxy, because distrusting models of marginal analysis is irremediably anchored in static assumptions and closed markets. In the equations model described by the author, a closed national economy also affects the price formation process by limiting or reducing competition and flexibility. If the concentration of market generates rigidities, increased competition contributes to reduce them, even if the competition comes from abroad.

Labini acknowledged that productivity is higher in more concentrated industries not only because of the economies of scale but also because of innovations are more likely to happen on those settings. Analyzing from the consumption point of view, he also recognized the price discriminations between the behavior of retail and wholesale prices. A last benefit of concentrate industries is that, to implement innovations, capital availability to be invested is required, in this sense, economic concentration leads to an increased ability to self-finance investment projects, caused by cost reductions, the inflexibility of prices and rising profits are translated into greater financial capacity of firms, which takes place at the expense of lower interests rate and the virtuous circle that would lead this decline for the rest of the economy.

Notwithstanding these 3 points aforementioned, he advocated that on those environments benefits are immediately transferred to firms and they take longer to arrive to final consumer if compared to a market exposed to international competition where traders would have more difficulty to rise domestic final prices in order to maintain stable mark-up costs. Labini explains that more

concentrated markets tend to generate consumers' dependency preventing innovations that could lead to a breakthrough for a new model of business or new products.

The model used considers the downward inflexibility of prices for regulatory reasons, such as the support by governments for some sectors. Moreover, financing of technological advances and innovations can modify the coefficients technical production / output per worker. The trend of needing more and more capital and the specificity of the knowledge acquired by employees press firms on cutting jobs reducing costs. Therefore, the increase in business profit as a result of the fall in costs exert deflationary pressure, or at least subside deflation predicted by conventional theory.

Furthermore, the increase in productivity generated from technological innovation inhibits inflationary dynamics in place to stimulate the increase of wages. While prices become rigid downwards, wages increased systematically related to productivity. This reinforces the explanation of generating downward rigidity due to the incorporation of new technologies to process productive under conditions of oligopsonistic markets are not compelled to deflacionary trend, thus the endogenous genesis of the phenomenon of asymmetrical variations between final prices and entry prices for middlemen will be constant of outliers giving graphics the wave appearance showed in the conclusions of this thesis.

So, assuming that prices are not perfectly flexible, that profits will rise and technological progress can accentuate concentration, it is necessary that States intervene to lessen and repress the advantages of large firms over the smaller ones, and disrupt collusions since it will not operate autonomously. The contribution of economic policies is, at the same time, desirable, since Market Authorities act over real cases. It is indispensable to remedy these economic disparities because growth is not only economic development, it must be an instrument of civil and social progress; it must be a broader and more comprehensive concept.

Conclusions:

One of the hypothesis that supported the idea of carrying out this research was the comprehension that several theories about oligopolistic cartels are not applicable to oligopsonistic ones. Empirical observations during this research showed up that, in some points, oligopsony and oligopoly are diametrically opposed and they cannot be scientifically treated under the very same assumptions.

Firms which left an oligopolistic collusion can eventually have high profits, on the other hand, middlemen who run away from a oligopsonistic cartel will have only a handicap, paying higher prices to producers without any changes in final market prices. The stimulus, as proved in this work, is much stronger in oligopsonistic cartels, requiring a close vigilance of market authorities.

So, the first conclusion possible after this research confirms one of the hypothesis: Although it is possible to use several theoretical framings of the studies about oligopoly, oligopsony questions need proper and independent scientific parameters. Few attempts to use unrestrictedly oligopsonistic assumptions ended up in failure, and although some responded well it was not possible to establish a correlation in the use of oligopolistic and oligopsonistic contrivances.

The second conclusion that we can take out of this research is inwardly linked to the first one. After a several try and error attempts it was clear enough that it is possible to invert inputs on the parameters based on the fact that they are uttermost market phenomena. Although the premise is valid, mere inversions have showed ineffective to analyze stochastic data in prices policy and outcomes were unreliable to reach any inference. Thus, a suitable development of a new field of studies is required, even if the state of the art is supportive and provide refined tools to understand the oligopsonistic phenomenon.

The third conclusion that we can extract from this work is that the theoretical results in every chapter provide substantial support to the idea that producers with lower mobility or relative immobility across markets, especially if they sell in a local and uncompetitive settings suffer consequences of authoritative prices mark-up by middlemen in collusion. These characteristics are even accentuated for seasonal and perishable products. On these markets middlemen concentration is getting bigger and bigger and food safety is a strategic power that cannot be under strict market

rules. Consumers can stop buying cars or mobiles, but they cannot stop buying food in consequence of an unexpected price increase. It is needed to act now.

The fourth conclusion is procedural: to derive outcomes from price policies, two rather simple measures were employed: price elasticity and substitution effect. Although these estimations are intuitively reasonable, they possess certain practical advantages: we did not take the number of firms as a measure of market competition because differences in sizes matter.

For instance, a market can have 40 enterprises, but only 2 control 90% for the whole demand, it could be a source of concern for the appropriateness of the equate formula in case we had taken a fix number, because as a result of the relatively high number of firms, that market is considered to be competitive, when in fact it is a duopsony situation. So, we assume that substitution effect and price elasticity from the perspective of Edgeworth Box, Kinked Demand Curve and Slutsky Diamond, taking account possible misleading caused by Labini Deflationary tendency and Giffen effects, are robust theoretical tools to review the existence of oligopsonistic collusions in action.

The fifth conclusion is that the Equilibrium under oligopsony conditions is very fragile and ephemeral not only if compared with perfect competition situations but also when counterpoised with another market imperfections, such as oligopolies, dumping or monopoly, (as non-exhausting list). That is due the fact that price variations is the core of oligopsonistic collusions.

When oligopolistic cartels control price policies, industry production capacity is below its potentiality, making supply curve more inelastic, however, when oligopsonistic cartel acts demand curve more elastic. When middlemen act as an oligopolistic and oligopsonistic so they obtain in both roles and increased market power. The double personality of the oligopolist-oligopsonist middlemen has, therefore, a germinate negative impact either producers or consumers, because its deeds on the one hand reduces demand to producers caused by lowering prices as middlemen as a buyer, and on the other hand reducing offer, final prices raise.

Summing up, these both strengths will never reach a stable balance because undulating prices is the main goal of oligopsonistic collusions. By making final prices high until the limit of consumers capacity and on the other uttermost shrinking producer incomes, middlemen get the most out of their activity. Their benefits ended up increased buying cheap and selling expensive, affecting effective supply of the initial producer and the effective demand of the final consumer.

In addition, a negative effect is found in the case of local intermediaries since they generally operate as exclusive introducer in central markets, building an oligopsonistic cartel that producers end up depending on. This position allows colluders to buy at such low prices that they

prevent the capitalization of small and medium-sized producers and sell at a price so high that it reduces the final consumption until the level of Pareto Optimum.

When analysing oligopsonistic actions it is important to remind that companies do not necessarily aim at rising sales but to rise profit. It is better to sell less to higher prices than sell more to small prices, more sales mean more after-sales costs, whereas more profits mean only more profits.

It is also widely know that brokers are an important key in the chain of the distribution of the wealth produced, but so are producers and consumers, and the difference that exists between the prices to which primary manufactures or husband-men sell their products to intermediaries and those that eventually consumers pay are growing faster and bigger. This new reality is bringing up a society of the middlemen. Great, powerful and totally invisible cartels are rising throughout the world and dominating the XXI century's economic scenario silently.

This "new deal" is dangerous since more than 20% of the world population still suffer from basic needs, so it is important not only produce more, but make basic products to reach every corner of this world, but the economic features that are being portrayed for the years to come do not stimulate production and and make the middlemen not being interested in markets with low or medium profitability, which is the case of developing countries.

The difference between producer's profit and the one that brokers take is so broad that discourage new producers to endeavour, which is disastrous for future perspectives. We have been trying to show this silent hazard the whole thesis, and it was possible, based on the research, to prove that the problem is real and imminent.

A sixth conclusion possible is that even a weak oligopsonistic cartels are harmful since they tend to grow stronger insofar as a small handicap caused by the cartels is enough to start a spiral process of under-capitalization in the sector which will reduce the level of general consumption and dependence of the colluders to cover costs by rising production for a smaller price. As in this process oligopsony cartels under-demand and under-supply the market, it will generate huge production losses, carbon emission, tons of waste, lack of investments in new technologies, old equipment, increasing producers stocks among other consequences that are possible.

These negative effects are not characteristic of a specific sector, they are overall. Moreover, they may beget concentration on the other extreme of the chain: final consumer. Markets submitted to oligopsonistic competition has a strong likelihood to become oligopolistic as well.

Intermediaries play an important role when they do not act as oligopsonists-oligopolists agents, since they facilitate the movement of goods, making their final price decrease for the final

consumers. Rising costs of distribution and circulation of the products will make market be more susceptible and attractive for cartelists.

It is also necessary to remind that higher prices mean less sales and consequently minor economic activity which is equal to less jobs and wealth. These negative aspects are such that market authorities must act now taking measures of economic policy in order to protect final consumers, producers and the society as whole. However, in order to make this protection, the first step is recognize the existence of an oligopsonistic cartel and that is what this thesis intend to collaborate.

The *oligopsonistic intermediate price wave* is based on the behave of the prices of buying from producers (input prices) and the prices which goods are sold to final consumers (output prices), the difference between them is the oligopsonistic income[55]. Output and input prices tend to hold off from each until the limit where input prices are too small that producers has no incentives to keep producing where, on the other uttermost, output prices, based on the shortage will be so high that final consumer will run away to competing products. A part from that, the mark-up will be so high that the cost of keeping oligopsonistic collusion under control will exponentially rise.

On this very point, all the forces start to converge to press output prices down and input ones up until the point where producers profit will be high enough in order to attract new entrepreneurs or to reclaim the old producers with an idle capacity of production to retake primitive production level and keep the market stocked. On the other side, output prices will have decrease enough in order to regain old consumers, markets will be provided enough to restart the process again.

The first hypothesis had a very strong restriction, which was the equilibrium and the constant returns to the scale and (ch. 4) **Erro! Fonte de referência não encontrada.**, graphically described the interactions among all these forces as follows: *graph 31 - Oligopsonistic Wave with constant returns to scale:*

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[55] It is not possible to say that it would be the profit because it is necessary to subtract the cost of the oligopsonistic, there including the cost of maintaining the oligopsony.

Oligopsonistic Wave
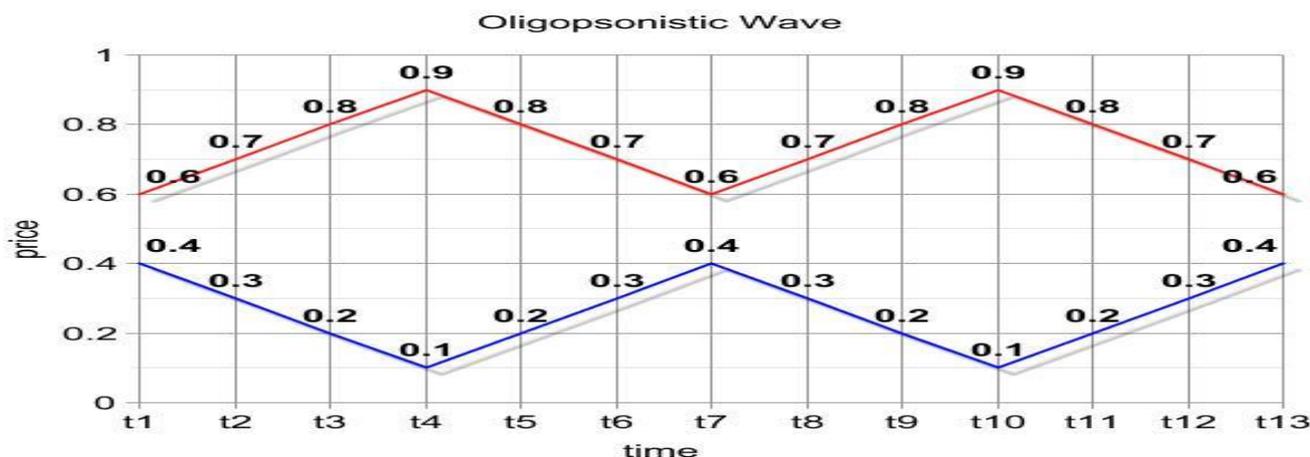
However, as explained in ch. 6.1, after replacing Simultaneous Equations Method for the price transmission with co-integration, we reach a stable model to measure displacement effect by an exogenous supply shock equation, as explained in ch. 4 and 5:

$$d \ln Q = \psi_A d \ln A + \psi_M d \ln M$$

with the market characterized by oligopsonistic power with non-constant returns to scale, which proved to be much more realistic, **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** (the primary sector and marketing inputs) are respectively denoted by **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**. It means that it will reduce to the cost shares **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.** respectively. We also proved that the demand price elasticity of the final consumer is the inverse of the intermediate industry to the primary market: **Erro! Fonte de referência não encontrada.** and **Erro! Fonte de referência não encontrada.**.

The parameter denotes the elasticity of primary sector supply to exogenous supply shocks and the marketing partial supply inverse elasticity is denoted by the parameter **Erro! Fonte de referência não encontrada.** in:

$$d \ln W = \gamma d \ln M$$

So since we assume that **Erro! Fonte de referência não encontrada.** represents the elasticity of substitution between the primary market and marketing inputs and **Erro! Fonte de referência não encontrada.** denotes a change in the mark-down which follows an exogenous supply shock, such that **Erro! Fonte de referência não encontrada.**, given **Erro! Fonte de referência não encontrada.**, we achieved:

$$d \ln P = \frac{1+\mu}{1+\delta} d \ln R + \frac{1}{1+\delta} \left[(\rho - 1) - \frac{1+\sigma(\rho-1)}{(1+\delta)\sigma\rho} \beta \right] d \ln A$$
$$+ \frac{1+\sigma(\rho-1)}{(1+\delta)\sigma\rho} \beta d \ln M$$

where, by the other hand **Erro! Fonte de referência não encontrada.** is the magnitude of deviation in the mark-up which follow an exogenous supply chock.

Finally, we observed that:

$$d \ln W = (1+\mu)d \ln R + \frac{1+\sigma(\rho-1)}{\sigma\rho} \alpha d \ln A$$
$$+ \left[(\rho - 1) - \frac{1+\sigma(\rho-1)}{\sigma\rho} \alpha \right] d \ln M$$

This model is much more realistic and accurate with a microeconomic theory. As we know, there is a gap between the oligopsonistic cartel action in the intermediate market and its repercussion in the final prices to consumers. It is due to the fact that oligopsonistic collusions control fully the intermediate price while final prices are more submitted to demand x supply equilibrium, therefore the is a disparity in time to transmit endogenous control to final consumer.

Moreover, this logic make entry prices vary sharply whether in ups or downs. So, the graphic of price transmission in oligopsonistic market has this layout as follow:

Graph 32: Price Transmission in Oligopsonistic Market
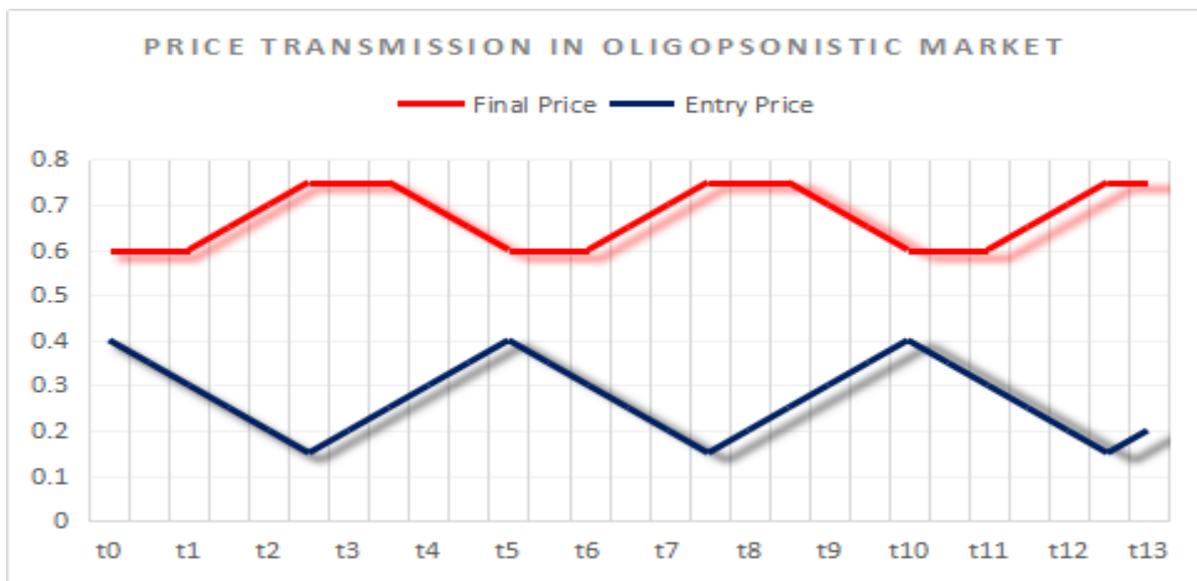
And why is it negative? These instabilities can lead producers to bankruptcy, they reduce production since and prevent market from predictability and expectations. Average prices are higher than it would be within a more stable market, society as whole loses, producers lose, consumers lose, the only ones to have benefits in this situation are the oligopsonistic agents.

How should Regulators prevent this market failure? The research is a tool for authorities to prove oligopsonistic collusions since output prices can hide the whole strategy, which is framed on inside forces detected if authorities would have access to their accountability, but, having in mind that this is a criminal activity thus oligopsonistic agents would not be naïve enough to furnish proves that would incriminated them.

So, differently from the oligopolistic cartels, where final prices is a robust evidence, markets authorities have a bigger trial to face because, without inside job, it is a Herculean task.

Our suggestions so that oligopsonistic cartels phenomena can be prevented is:

a) improve the transparency of the price mechanism;

b) popularize and promote the study and research on Oligopsonistic phenomenon;

c) stimulate price stability where people can recognise changes in relative prices, without being confused by changes in the overall price level.

d) create mechanisms to keep consumers well-informed about consumption decisions helping them to allocate their resources more efficiently;

e) reducing inflationary rates for money emissions;

f) reducing real interest rate;

g) increasing incentives to invest and produce;

h) avoiding unproductive activities to hedge against the negative impact of inflation or deflation;

i) reducing distortions of inflation or deflation, which can exacerbate the distortionary impact on economic behaviour;

j) preventing an arbitrary redistribution of wealth and income as a result of unexpected inflation or deflation;

k) and contributing to financial stability;

l) Improving International Regulatory co-operation, in all its forms;

m) Improving global governance;

n) Stimulate direct negotiations between regulators and other international and transnational institutions;

o) Promoting forums for interaction and as collective rule-makers in order to understand and institutionalise oligopsonistic prevention.

The Nobel Committee said:

"*To design economic policy that promotes welfare and reduces poverty, we must first understand individual consumption choices. More than anyone else, Angus Deaton has enhanced this understanding*".

We agree, and we firmly believe in the importance of the understanding consumer choices and the magnitude of middlemen work in the chain of distribution of wealth, however we also firmly believe that Ferrer is right and we conclude with his quote:

"Los intermediarios deben cumplir una función importante cuando no actúan como monopsonistas/monopolistas. Facilitan la circulación de mercancías llevándolas a los centros de consumo final reduciendo los costos de distribución y circulación de los productores y facilitando la labor de elección de los consumidores. Sin embargo, los aspectos negativos son de tal magnitud que ameritan medidas de política económica para su corrección."[56]

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[56]   Ferrer, 2010. Free translation: *"Intermediaries should play an important role when they act as monopsonists / monopolists. Facilitate the movement of goods taking them to final consumption centers by reducing the costs of distribution and circulation of producers and facilitating the work of consumer choice. However, the negative aspects are such that merit policy measures for correction."*

Notes:

Introduction:

Note i.1 : Slutsky also produced a very fruitful research in probability and in stochastic process. He wrote about economics of investments, too. In 1927, for instance, he published 'The Summation of Random Causes as a Source of Cyclical Processes" and opened up a brand new approach to business cycle theory by hypothesizing that the interaction of chance events could generate periodicity when none existed initially, however, for the horizon of this research, his researches in econometrics and microeconomics interest most.

Chapter I:

Note 1.1.1: Since cartels are illegal, Trusts, being a Cartel subspecies of Cartel are also considered illegal in most of legislations throughout the world. Penalties and fines are generally the same for both practices. The reason why they are economically and juridically studied separately it is because their structures and evidences are different although market effects are the same. The major problem in trials is proofing the existence of them, and the traces they leave behind are poles apart. This research intends to present theoretical econometric and graphic tools so that these practices can be unveiled in courts.

Note 1.5.1: its name is a fair tribute to the John Sherman, Senator of Ohio, former chairman of Finance Committee and Secretary of the Treasury under President Hayes; Sherman wrote several pieces testifying the economic and social damages which come from trust actions and he was the first politician to come up with a bill to prevent and punish cartels and trusts practices.

Note 1.5.2: Formally, most of countries around the world has Markets authorities, but they are concentrated in combat and prevent other market failures such as monopolies, duopolies, oligopolies,

Dumping, Entry Barriers, De-merit Goods, Incomplete Markets, Unstable Markets, Information Failure, Inequality, etc. Oligopsonistic Cartels actions are practically out of the sight in Market Authorities daily issues.

Chapter II:

Note 2.2.1: It may sound antagonist because oligopsonistic cartels are made for being national or world wide spread, however, oligopsonistic cartels act locally, and direct with the small suppliers, much more passive to be controlled, and normally, they are previous to the great oligopolistic cartels, because, in order to achieve control of supply, is structural to have control over the purveyors, that form the basis of an oligopoly. It is built with oligopsonistic bricks.

Note 2.2.2: Could be more products or services, but to streamline we decided to use only 2, which is enough to be mathematically sensible to substitution effect for oligopsonistic market analyzes. The proposal is not specific the study of substitution effect, but of its effects on the oligopolistic markets.

Note 2.3.1: Translation: It is important to note that the greater elasticity of demand is not translated into benefits for the consumer but only for the middleman. (...) where the intermediary acts as a monopolistic or oligopolistic is interesting to note that if the monopoly infrasupplies the market, the outcome is making the offer more inelastic, the monopsony makes demand more elastic, obtaining in both cases increased market power. The twofold personality of monopsony-monopolist has, therefore, a double negative impact on the competitive market, on one hand it reduces demand forcing producers to reduce prices, and on the other hand, lower offer of the product on the market leads prices to rise for final consumers. Thus, benefits are increased, because the buy for lower prices and sell for higher ones, affecting the final consumers' effective demand and the effective offer of the initial producer.

Note 2.3.2: Although oligopolistic / oligopsonistic, duopolistic / duopsonistic and monopolistic / monopsonistic frames are thricely considered market failures they share not many characteristics in common when analyses come to competition. The first one is a type of imperfect competition whereas the second one there is no competition at all. In common we can assume that there are

significant barriers to entry of other firms or other buyers[57], but even in this aspect there are considerable differences: Rules which maintain monopoly / monopsony barriers to entry are more likely due to natural reasons, high capital requirement or high distribution overheads of distribution, government regulation, technology and patents; in an oligopoly / oligopsony barriers to entry tend to be high due to the economies of scale and long periods of high profits which allow oligopolistic/oligopsonistic agents to use them to prevent new competitors to step into their market. A monopoly draws power from the fact that it is the only viable seller of the product in the industry, in an oligopoly however, firms can influence the market by setting their price policies in illegal concerts. Only the oligopolistic/oligopsonistic cooperation is made in a scheme of trust there are some similarity between them, apart from that case, it is needed totally different scientific approach to study these phenomena; that is why we exclude monopoly/monopsony on that consideration.

Note 2.4.1: During the U.S.S.R. period, price rigidity was tried Marxian economists even propose price rigidity during the U.S.S.R. period, but it did not work. notwithstanding, these speeches are made to the masses. A deeper level of analysis of the phenomenon shows us that in oligopolistic / oligopsonistic structures of market prices are stable, however in high level. It is sure that avoiding both prolonged inflation and deflation is not only desirable but necessary; the maintenance of price stability is the primary objective of Central Banks throughout the world as it must be. Police makers instead should focus in competitiveness, not stability. Of course in a very competitive market where consumers and suppliers are price takers, more stability is observed. Small variations around the market price are normal and tend to be corrected in short term, but it is a consequence of a well regulated market, not an outcome of financial policy.

Note 2.4.2: Short period and not fierce price wars between companies in an oligopoly (not in a cartel) are admitted under the kinked demand curve model. During these price war, firms in the market are seeking to snatch a petite term advantage and win over some tiny extra market share, in any case consumers advantages are insignificants and transitory, never exceeding the losses caused by the market manipulation.

Chapter III:

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[57] *In case of oligopsonistic market*

3.2.1: Obviously we use the word "evidences" instead of "proves" because in oligopsonistic markets data is private, entrepreneurs will not make them public. It will not be a rational decision. It would be a criminal prove against them, thus, researches have no access to them. Notwithstanding, evidences are robust enough to reach the conclusions we are wanted.

Chapter IV:

Note 4.1.1: Chen introduced price shocks and income shocks to the monkeys' economy. Let's say Felix's favorite food was Jell-O, and he was accustomed to getting three cubes of it for one coin. How would he respond if one coin suddenly bought just two cubes? To Chen's surprise, Felix and the others responded rationally. When the price of a given food rose, the monkeys bought less of it, and when the price fell, they bought more. The most basic law of economics—that the demand curve slopes downward—held for monkeys as well as humans. Now that he had witnessed their rational behavior, Chen wanted to test the capuchins for irrational behavior. He set up two gambling games. In the first, a capuchin was shown one grape and, dependent on a coin flip, either got only that grape or won a bonus grape as well. In the second game, the capuchin started out seeing two grapes, but if the coin flip went against him, the researchers took away one grape and the monkey got only one. In both cases, the monkey got the same number of grapes on average. But the first gamble was framed as a potential gain while the second was framed as a potential loss. How did the capuchins react? Given that the monkeys aren't very smart in the first place, you might assume that any gambling strategy was well beyond their capabilities. In that case, you'd expect them to prefer it when a researcher initially offered them two grapes instead of one. But precisely the opposite happened! Once the monkeys figured out that the two-grape researcher sometimes withheld the second grape and that the one-grape researcher sometimes added a bonus grape, the monkeys strongly preferred the one-grape researcher. A rational monkey wouldn't have cared, but these irrational monkeys suffered from what psychologists call "loss aversion." They behaved as if the pain from losing a grape was greater than the pleasure from gaining one.

NOTE 4.2.1: As if Chen needed any further evidence of these parallels, the strangest thing happened in the lab. Felix scurried into the testing chamber, just as he'd done countless times before, but on

this day, for reasons Chen could never understand, Felix did not gather up the twelve coins on the tray and use them to buy food. Instead, he flung the entire tray's worth of coins back into the communal cage and, fleeing the testing chamber, dashed in after them—a bank heist followed by a jailbreak. There was chaos in the big cage, with twelve coins on the floor and seven monkeys going after them. When Chen and the other researchers went inside to get the coins, the monkeys wouldn't give them up. After all, they had learned that the coins had value. So the humans resorted to bribing the capuchins with treats. This taught the monkeys another valuable lesson: crime pays.

Chapter VI:

Note 6.2.1: It is important to remark that there is no value judgement in middlemen deeds. Observations of cartel actions are based on facts and stimulus, judgements are to be done for Market Authorities. The main point here is decipher what is behind the measurable outcomes of cartel actions.

Note 6.2.2: We assume as normal behaviour to maximizing profits in a capitalist system, the critics are about the way that intermediate firms do it. Collusion and manipulations are bad practices and they harm free competition.

Note 6.3.1: This is a strictly econometric view of the consequences of a cartel desertion, but it is important to remind that Cartel are out of law societies and intimidation, blackmails, violence and even murders are plausible comings of a non-authorized cartel blow-off.

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[58] Table in alphabetical order considering only the name of the site, excluding address protocol such as http; https or www. Extensions of the home page are not consider as well, only the main home address.

Grammar and Orthography Review:

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Appendix;

Appendix A:

ITALY - APPLICABLE REGULATORY FRAMEWORK

A.1 Applicable competition law provisions Italian Law No. 287/1990 ("Competition Act") does not contain any substantive provision specifically referring to trade secrets. In Italy, specific protection to trade secrets is granted under IP law, unfair competition law and criminal law. However, the general provisions contained in the Competition Act and relating to illicit agreements/concerted practices (Article 2 of the Competition Act) and abuses of dominant position (Article 3 of the Competition Act) may apply also to situations relating to the licensing, disclosure of (or refusal to disclose) trade secrets. Furthermore, like other national competition authorities and national courts within the European Union, the Italian Competition Authority ("ICA") and Italian Courts have the power to enforce Article 101 and Article 102 of the TFEU. In this respect, Italian competition law – likewise EU competition law – may impact on trade secrets, but only in circumstances where the use of (or refusal to transfer) trade secrets have an impact on competition, which is the final object of competition law protection.

A.2 - Definition of trade secrets as a general remark, scholars have stressed the difficulties in identifying what sort of information can qualify as trade secret, since the concept of information has no conceptual boundary, and trade secrets are sometimes lumped in with "know-how". The Competition Act does not provide for a definition of trade secrets. Furthermore, in Italy, application of competition law has not led to decisions or judgements clearly dealing with trade secrets *strictu sensu, i.e.*, secrets corresponding to patent entitlement situations, and in particular when a new and origin al solution – able to have concrete embodiments in the industrial field such as to bring progress with respect to existing techniques and knowledge (extrinsic novelty) and to express a creative activity on the part of the inventor – is bound to a technical problem. The very limited decisional practice and jurisprudence available in Italy – which, however, never enters into the definition of trade secrets – does instead deal with a general concept of know)how and with the concept of competitively sensitive information (i.e., information relevant to unveil the commercial strategy of the company: in general, sensitivity of information depends on whether or not that information would normally be regarded as business secret), which are notions that appear broader than the core of trade secrets as above indicated and also broader than the concept of technical) industrial information, but that may nonetheless fall within the definition of trade secrets provided by Article 98 of the Italian Code of Industrial Property. In this respect, please refer to the Commercial and IP Chapter. This chapter will accordingly refer to a broad concept of trade secrets, which is in line with the available indication, mainly provided by the ICA and with the provisions of   Article 98 of the CIP.

A.3 - Applicability of EU competition law principles : The ICA and Italian courts do take into account the decisional practice of the European Commission, and Italian competition law shall be interpreted in accordance with the principles of the European Community competition law. This implies that, in relation to 71 the applicability of Article 2 of the Competition Act and Article 101 of the TFEU, the ICA does apply in reviewing agreements involving the transfer of know)how and the EU Transfer of Technology Block Exemption Regulation of 2004 ("TTBER"). Similarly, the European Commission's decisions – together with the judgements of EU Tribunals – concerning the applicability of articles 101 and 102 of the TFEU will definitely impact on the conclusions that the ICA and Italian courts will draw

when assessing agreements or abuses of dominant position concerning trade secrets.

A.4 - Decisional practice of the Italian Competition Authority Scholars have indicated that the antitrust treatment of trade secrets has remained largely hidden and that there has been little separate focus on the competition problems that trade secrets may present. It is worth noting that the decisional practice of the ICA does not expressly enter into the notion of trade secrets, and more in general the expression "segreto industriale" can be hardly found when reviewing the decisional practice of the ICA) only nine ICA decisions, eight of which relate to concentrations. The ICA has indeed focused on the notion of "competitively sensitive information", which has, however, come into play mainly in decisions relating to violations of the prohibition to enter into agreements restricting competition – the exchange of sensitive information as per se violation or as evidence of the existence of horizontal agreements to fix prices or share the market – and on the concept of "know)how". The ICA has never adopted any decision considering as illicit vertical agreements involving the transfer of know)how. As far as agreements ancillary to concentrations are concerned, the ICA does apply the Commission Notice on restrictions directly related and necessary to concentrations ("Notice on Ancillary Restraints"). However, the most relevant issue relates to the decisions dealing with unilateral behaviours by dominant undertakings pursuant to Article 3 of the Competition Act or Article 102 of the TFEU. To start with, no decision expressly identifies as abusive situation where a dominant undertaking has obtained from its weaker contractual counterparties information or know)how that may qualify as trade secrets. In a case relating to an abuse of dominant position the ICA, even though recognising that the dominant undertaking has benefitted from its competitors' know)how due to the contractual relations with the latter, did not develop this point further and focused on other abusive (exclusionary) conduct of the dominant company (Posta Elettronica Ibrida decision No. 15310 of 29 March 2006). Italian competition law has played a more active role in obliging dominant undertakings to grant access to certain information or know)how. In the Sapec agro/Bayer Helm decision (decision No. 22558 of 28 June 2011), the ICA dealt with the refusal by a dominant undertaking to grant access to its competitors to two medical studies on the effects on men and environment of a certain active ingredient for a fungicide.The ICA, in assessing the case, stressed that it was not possible to duplicate the studies due to applicable laws, and followed the steps recognised by EU Competition law to apply the essential facility doctrine. In particular, the ICA evaluated (i) whether the two studies were or not duplicable; (ii) the absence of any alternatives on the market; (iii) the link between the refusal and the incentives for competitors to innovate (citing in this regard the EU Microsoft case); (iv) the existence of objective justification to the refusal; and (v) the elimination of competition and harm to consumers. It is worth mentioning that the 72 ICA expressly made reference to the EU approach, stating that such approach provides for a high level of competition protection, which may prevail on the protection of IP rights when balancing such two aspects (citing in this regard the EU Magill Microsoft and IMS cases). The decision has been however annulled by the competent administrative court, which confirmed the principles expressed by the ICA, but contested that the medical studies were not duplicable. Other cases relating to the refusal to disclose information appear more peculiar, since they are strictly related to the monopolistic position of the dominant undertaking, due to exclusive licences or provision of a service of public interest. In two of these cases Comune di Prato – Estra Reti Gas, Decision No. 23243 of 25 January 2012; Comuni Vari – Espletamento Gare Affidamento Servizio di Distribuzione Gas, decision No. 23114 of 14 December 2011), relating to the distribution of gas in Italian municipalities, the ICA considered as an abuse of dominance the refusal by undertakings enjoying a monopoly in the provision of a service of public interest to disclose certain confidential information to Italian municipalities) information mainly concerning the value of the distribution infrastructure, the volume of distributed gas and the list of clients. Specific reference was made to the fact that the information not disclosed by the dominant undertakings was necessary to the municipalities in order to draft a call for

tender not penalising the incumbents' competitors, and had been acquired and developed by the incumbents due to their monopoly position. It should be noted that , during the investigation, the ICA requested clarifications from the Ministry of Economic Development and to the Italian Energy Authority in order to verify to what extent the refusal by the dominant undertakings would have prevented the possibility for the involved municipalities to prepare a call for tender not penalising (in a way,to make it impossible to compete) the dominant undertakings' competitors. Emphasis was also given to the fact that it was not possible to replicate such information. Another case (Giochi247Sisal, decision No. 22301 of 13 April 2011) related to the refusal by the dominant undertaking (exclusive licensee for the managing of numerical games in Italy) to provide competitors with information necessary to have their Virtual Point of Sales (Punti Vendita a Distanza) communicating with the server used to collect bets for numerical games. The case was closed with the ICA making binding commitments proposed by the dominant undertaking; accordingly, the final decision did not evaluate whether, and under which circumstances, the behaviour constituted a violation of competition law. However, the commitments proposed by the dominant undertaking did – in a way compatible to the legislation regulating the sector – provide the possibility to communicate with the server.

Appendix B

Summary of food price increases by commodity per competition index

Calculated using data from FAO (2009 B)

(1 = uncompetitive | 5= high competitive) based in 83 countries

Commodity	Number of price series	Increase in domestic price (in US$)	Increase in world price (in US$)	Index of Commodity Competition (1 -5)
Beans	9	41%	45%	5
Cassava	5	12%	13%	4
Maize	26	87%	112%	2
Millet	5	43%	62%	2
Plantains	2	9%	9%	3
Rice	24	62%	41%	5
Sorghum	4	56%	81%	3
Wheat	7	65%	111%	1
Average	10,25	46,875%	46,75%	3,125

Appendix C:

Table of relevant studies of Price Transmission in Commodity Markets carried out from 1997 to 2007.

Rico Ihle *et* Stephan von Cramon-Taubadel (2008)

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number	1	2	1	2	2	3	2	3	7	5	7

Publication	Product	Region	Model	Cont	Sym	Adj
Agüero (2007)	Tomatoes,	Peru	TVECM	-	-	-
Alemu and Biacuana (2006)	Maize	Mozambique	EQ-TVAR	-	no	yes
Bakucs and Fertő (2007)	Milk	Hungary	TVECM	-	-	-
Balcombe et al. (2007)	Wheat	Argentina	EQ-TVECM	-	yes	yes
Balcombe et al. (2007)	Soya	Brazil	Band-TVECM	no	yes	yes
Balcombe et al (2007)	Mayze	USA	Band-TVECM	no	yes	yes
Ben-Kaabia and Gil (2007)	Lamb	Spain	EQ-TVECM	-	yes	yes
Ben-Kaabia et al. (2005)	Poultry	Spain	Band-TVECM	no	no	no
Ben-Kaabia et al. (2002)	Lamb	Spain	TVECM	-	-	-
Chen et al. (2005)	Crude Oil, Gasoline	USA	ECM	-	-	-
Dercon and van Campenhout (1998)	Rice	Philippines	Band-TAR	yes	yes	yes
Ejrnæs and Persson (2000)	Wheat	France	Band-TVECM	yes	no	no
Escobal (2005)	Potatoes	Peru	Band-TAR	yes	yes	yes
Federico (2007)	Wheat	Italy	Band-TAR	yes	yes	no
Goodwin and Grennes (1998)	Wheat	Russia	Band-TAR	yes	yes	no
Goodwin and Harper (2000)	Butter	USA	EQ-TVECM	-	no	yes
Goodwin and Holt (1999)	Pork	USA	EQ-TVECM	-	no	n.m.
Goodwin and Piggott (2001)	Beef	USA	EQ-TVECM	-	no	n.m.
Goodwin et al. (2002)	Corn, Soybean	USA	EQ-TVECM	-	no	n.m.
Jacks (2005)	Wheat	Atlantic economy	Band-TVECM	yes	no	no
Jacks (2006)	Wheat	Atlantic economy	Band-TVECM	yes	no	no
Lo and Zivot (2001)	CPI	USA	Band-TVECM	yes	yes	no
Luoma et al. (2004)	Beef, Pork	Finland	TVECM	no/ yes	-/ no	-/ yes
Lutz et al. (2006)	Maize	Benin	Band-TVECM	yes	yes	no
Meyer (2004)	Pork	Germany, Netherlands	Band-TVECM	no	yes	yes
Obstfeld and Taylor (1997)	CPI	World	Band-TVECM	yes	yes	no
O'Connel and Wei (2002)	CPI	USA	TAR	-	-	-
Park et al. (2007)	Natural Gas	Canada, USA	Band-TVECM	no	no	yes
Pede and McKenzie (2005)	Maize	Benin	TVECM	-	-	-
Sephton (2003)	Corn, soybean	USA	TVECM	-	-	-
Serra and Goodwin (2003)	Dairy	Spain	EQ-TVECM	-	no	yes
Serra and Goodwin (2004)	Eggs	USA	TVECM	-/ n.m.	-/ n.m.	-/ n.m.
Serra, Gil et al. (2006)	Pork	Denmark,	EQ-TAR	-	no	yes

Erratum:

Financing:

Università degli Studi di Messina - ME

Italia

This research was funded by the Research Division of the Department for High Studies of the University of Messina, Faculty of Economics, as part of the XXVII Doctorate cycle of Economic Science and Quantitative Methods, counting as well with funds from the EU (European Union) and Italian Government, through the M.I.U.R. (*Ministero dell'Istruzione, dell'Università e della Ricerca)*

Dedications;

- A Alba Marino, per l'amicizia;

- A Alberto Bernava, grande amico, ha fatto della Sicilia la mia casa!

- Al Professore Bruno Sergio Sergi, grazie per lo scambio di conoscenze e il rispetto con cui mi ha ricevuto.

- A Melania Plutino, per la amicizia nei primi e più difficile giorni di questa avventura, senza di te non sarebbe stato possibile;

- Au Professeur Philippe Delebecque pour sa disponibilité et pour guider mes pas à la Sorbonne

- À Sueli Moro, muito obrigado, você foi fundamental!

- Vicenzina Raffaele, grazie per tutto!

Post-Facio:

At my first day as an undergraduate student of Economics at UFJF, in 1993, my Professor Lourival Jr. stated that Economics is basically science of human choices! And we are not searching for money only, not even in Economics we could assume this assumption. We are searching for something unmeasurable: It is happiness! It was a jolt for a freshman who applied for College exams willing to work with graphics, finances, stock markets, currencies exchange, banks... This was my first record in my notebook (the ones still made of paper), and I have promised to myself that I would never forget my first lesson in College.

24 years later I faced one of the hardest decisions in my life: I applied for my second PhD at Messina University. It was not easy, especially in the very beginning but now, at the end of this cycle, I can say that I realized one thing for sure: for the fact that we make choices all the time, sometimes we get totally anesthetized of this whole process and we take for granted that the life that we live is not the outcome of our daily choices, but the only one possible as a result of everything else which we have absolutely no control. It is not true!

Of course, the world out there plays a role in our lives. John Done was right when he wrote: *"No man is an island, entire of itself; every man is a piece of the continent, a part of the main"*. We cannot ignore that society shapes us, however we are more than ventriloquist's dolls in fate's hands. We make choices, right ones, wrong ones, and it is important that we perceive them as choices, otherwise we will not learn to make better ones in the future, but instead we will just repeat the same old blunders.

In this thesis, I have tried my best. Mistakes are part of journey, they remind us that we are genuine human beings, that life is a never-ending learning process. No matter how old we get, how many titles we have or how many borders you have crossed, there is no such thing as final and complete wisdom.

If some say that it was a nonplus decision, if some say it was a mistake… it was the best of my life. I have only to assert that it was not just about what I have learnt out of this adventure, but also about people who helped me in the whole process, the experiences I lived and the dreams that I sowed for the future.

Many thanks to everyone who, in one way or another, helped me get here!

Annotations:

Annotations: