

Seminar Paper

**Determining Prices in the Information Technology Age:
How Can "Just Prices" Be Achieved for Good?**


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Abstract

The just price theory is one that has been thoroughly discussed throughout history but neglected in recent years, as economists now agree that the just price has been worked out to be the market price. However, studies show that the intuition of prices being unjust still exists. With the advancements in information technology and the resulting opportunities found in new pricing mechanisms, consumers feel increasingly exploited by price-setters. Through an extensive literature review historical and current pricing strategies are discussed and the concepts of social and personal fairness are used as a guide for justice in pricing. By taking a closer look into dynamic pricing in the airline industry, this paper illustrates how IT is leveraged in the formation of dynamic prices and suggests how just pricing could be achieved in today's IT-driven world.

Contents

Introduction	6
The Just Price	6
Definition	6
Justice	7
Price	7
Socially and Personally Fair Prices	7
Historical Perspective: A Timeline	8
Ancient Economic Thought (Before 500 AD).....	9
Economic Thought in the Middle Ages (500 AD – 15th Century).....	10
Mercantilism (16th – 18th Century)	11
Physiocracy (17th – 18th Century)	12
Classical Economics (1776 – 1870s).....	13
Neoclassical Economics (After 1870).....	14
Modern Perspective	15
Critical Evaluation.....	16
Objective Price.....	16
Voluntary Exchange Price.....	17
Non-Exploitative Price	18
Distributive Justice Price	18
Market Price	19
Pricing Strategies.....	21
Cost-Based Pricing Strategies.....	21
Value-Based Pricing Strategies.....	22
Competition-Based Pricing.....	25
Impact of Information Technology on Pricing Strategies	25
Increased Availability of Information	26
Enhanced Reach	26
Expanding Interactivity	26
Shift From Products to Services	28
IT-Enhanced Pricing Strategies (ITEPS).....	28
Differential Pricing Strategies.....	28
Internet Auctions.....	29
Revenue Management.....	29
Competitive Pricing Strategies	30

Online Signaling	30
Automated Pricing	31
Product Line Pricing Strategies	31
Product and Price Customization	31
Product Bundling	32
Dynamic Pricing in the Airline Industry	32
Roundup and Outlook	36
References	37

Introduction

The just price theory is often regarded in contemporary economic literature as an obscure concept developed by religious monks or naive philosophers who were oblivious to basic economic principles (De Roover, 1958). The general consensus nowadays is that the just price is broadly speaking the market price, the price as determined by the laws of demand and supply - the rest is sentiment. Defining a just price beyond that scope is often considered an unsophisticated and obsolescent approach to commercial life (Walsh & Lynch, 2001). However, even if just pricing is no longer an intellectual pursuit, the intuition that prices are unjust still exists. Bolton et al. (2003) found that consumers are generally inclined to believe prices being unfair, that is, higher than the fair price. Since price is a leading factor in the consumers' buying decision (Lobaugh et al., 2019), this greatly affects the profitability of firms and pressures managers into looking for alternative pricing mechanisms. As evident by the prevalence of laws establishing minimum wages or banning usury and the growing concern for overpricing among consumers, the underlying idea of the just price still lives on (Shirvani, 2014). Inherently, questions arise as to what constitutes a fair price.

A number of pricing strategies have been developed to address this issue. Researchers generally categorize pricing strategies into three groups: cost-based, competition-based, and value-based (Hinterhuber, 2008). Depending on the industry, country, and customers, it may make sense to use certain pricing strategies over the other. Ingenbleek et. al (2003) find that value-based pricing strategies are increasingly recognized to be the most superior in terms of profitability and consumer perception, however their implementation raises issues due to the complications that arise when attempting to measure value.

Recent advancements in information technology (IT) have opened a vast array of possibilities in how products are priced. Dixit et al. (2008) identify three main drivers that influence pricing: increased availability of information, enhanced reach, and expanding interactivity. This paper assesses both historical and current IT-enabled pricing mechanisms to reflect on justice in pricing in today's IT-driven world.

The Just Price

Definition

The just price has been thoroughly debated throughout history and therefore, depending on the context, a number of definitions for the just price have been put forth. In a first step it is crucial to determine how to define justice in the context of pricing. Without an agreed-upon definition of justice it will be impossible to effectively analyze the concept of a just price.

Justice

The author holds that justice requires judicial impartiality. Whether or not something is just must therefore be based on objective criteria, rather than bias to the individual. This means that, once rules have been agreed upon, any and every violation to these rules must be considered unjust. In the case that a player loses and feels that the outcome is “unfair”, it can be said that - as long as the agreed-upon rules were followed – the outcome is just. Any other judgement would defy the concept of impartiality. The focus of justice therefore doesn't lie in the outcome of a situation, but rather abiding by rules that have been agreed upon.

Price

While there exist various things that can be priced, this paper concerns itself with the pricing of goods and services. Wage prices, rent prices, dividends, commissions, taxation, and any other form of pricing that isn't the price of goods and services as determined by the seller are therefore beyond the scope of this paper and will be disregarded.

It was further decided not to account for the notion of emotional and physical prices in the context of social fairness, as these are subjective and often difficult to measure. When talking about a price, the author refers solely to the monetary value of goods and services, which unless specified, excludes the indirect costs or prices imposed on the consumer through purchase. This paper therefore assumes that if a product is sold at a price of 1\$ before taxes, only its monetary value - exactly 1\$ - will be considered in the assessment of its price fairness.

Socially and Personally Fair Prices

Furthermore, it is important to emphasize the distinction between a socially and personally fair price. A price that is socially fair abides by the social norms that have been set by society; if the price for a good or service is set in a way that violates social norms, it is viewed as socially unfair (Maxwell & Comer, 2010). In line with this concept, people are generally willing to go out of their way to ensure social fairness is being lived – even if they are not personally affected by it (Rabin, 2006).

Researchers have identified a few factors that influence our decision on whether or not a price is socially fair. These are the sellers' motives, inferred motives, profit margins, and value distribution (Bolton et al., 2003; Gielissen et al., 2008; Campbell, 1999). The same price can be considered socially fair or socially unfair, based on, for example, if the seller operates on a social motive or a profit motive. With regards to value distribution, consumers generally view a price to be more socially fair if a relatively large part of the revenue is distributed among parties other than the seller, especially minority groups. This is why Fairtrade products are regarded as socially fair, despite the higher price points when compared to alternatives. Maxwell states that a socially fair price should be

the same for everyone, however the author partly rejects this due to the notion that a socially acceptable price can differ between customer groups depending on their needs and current circumstances; while price discrimination should not be actively sought out, it can still be considered morally acceptable as long as sufficient alternatives are available to the customer. If the customer is not forced to make a transaction with a certain seller (as would be the case with monopolistic markets or the use of lock-in effects) and still chooses to purchase a seller's product at a higher price than other customers do, it is the customer's personal decision and the author does not deem the price unjust.

In contrast to social fairness stands personal fairness, which Maxwell describes as serving the interest of the individual. As individuals have varying needs and interests, personal fairness reflects the subjective perception of how something affects oneself. A price, therefore, that is personally fair, serves the economic interest of the individual. Unlike with social fairness, the judgement of whether or not a price is personally fair can differ from person to person. Personal fairness is heavily influenced by a self-interest bias; prices that are below the expected price point, or lower than the amount the individual was ready to pay, are considered personally fair.

In her book, Maxwell (2008) states that fairness embodies both personal and social fairness – something that is fair is both personally and socially fair. She illustrates this dual meaning of the term fair by translating it into German. In German, one meaning of fair is “angemessen” translating to “satisfactory”, while another is “gerecht”, translating to “just”. The contrast between satisfactory and just is the same contrast between personal and social fairness. Hence, according to Maxwell's definition, there is a clear distinction to be made between a just and fair price; a just price is one that is socially fair, while a fair price is a one that is both socially and personally fair.

Throughout this paper the terms just price and fair price will be used interchangeably. However, the author believes the socially fair price to be more reasonable than the fair or personally fair price, as it conforms to a certain standard of correctness and better aligns with the author's view on justice. Fleisher (2021) states that the main disadvantages of personal fairness are its implicit bias and its need for prior moral judgements, which limit its usefulness as a guide for fairness and creates a dubious concept of justice. When discussing the fairness of a price in this paper, social fairness will therefore take precedence over personal fairness.

Historical Perspective: A Timeline

The just price theory is one that has been discussed throughout history and forms the backbone of today's economic principles; pricing theories were developed on the basis of philosophical and economic considerations dating back to ancient times and shaped into what they are today (Blaug,

1997). In understanding the just price and how the modern pricing mechanisms surrounding it have emerged, the history of economic thought is therefore highly relevant. This section provides a condensed summary of the major developments in pricing and the resulting economic principles surrounding the just price. The author refers the reader to Söllner's (2021) book "Die Geschichte des ökonomischen Denkens" for a more comprehensive overview of the development of economic theory.

Ancient Economic Thought (Before 500 AD)

Many ancient Greek philosophers such as Hesiod, Xenophon, and Plato concern themselves with basic economic considerations. It wasn't before Aristotle however, that the first attempt at a proper economic theory was made (Söllner, 2021). In his books "Politics" and "Nicomachean Ethics", he outlines the basic principles of a theoretical economy. Aristotle's economic ideas are still of interest to us today. Most notably with regards to the context of this paper, his work details the purpose of exchange, money, and value, forming a baseline for the just price theory.

Aristotle analyzes the art of exchange wherein he distinguishes between natural and unnatural forms of exchange (Tesfa, 2002). Natural exchange aims to satisfy man's natural needs. It includes the art of acquisition and the exchange of resulting surpluses – so long as the exchanged goods are of equal value, or the exchange is voluntary. The art of acquisition provides natural resources that are limited in their obtainability and in the extent of man's natural needs for living a good life. In exchanging the surpluses, the value of the commodities is determined by the individual, as opposed to there being an inherent value of the commodity (Soudek, 1952). These values assigned to commodities depend on the needs and circumstances of the individual. A voluntary exchange, so Aristotle writes, is one both parties willingly agree to, and implies the equal perceived value of the exchanged commodities (Gordon, 1964). Unnatural exchanges, on the other hand, are carried out with the aim of generating profit, and therefore, money. The desire for money is not a natural need and thus said to be an unlimited one (Tesfa, 2002).

In Aristotle's theory of money, he accepts Plato's definition of money as being a medium of exchange. However, Aristotle elaborates on his teacher's theory by recognizing two additional uses of money: that of money as a means of storing value (i.e., for the purpose of deferred payments), and more importantly, that of money being the standard for measuring a commodity's value (Söllner, 2021). Interestingly, Aristotle's idea that a commodity's face value and exchange value are different is still represented in today's economy.

Although with some room of interpretation, Aristotle touches on justice in exchange. He believes that he who practices virtue will aim to evenly distribute wealth among society and correct

wrongdoing by balancing the gain of one party with the loss of the other (Söllner, 2021). In that sense, natural exchanges, by which the exchanged goods are of equal value, are just exchanges. It follows then, that voluntary exchanges, which are mutually satisfactory and represent an equal exchange based on individually assigned values, are also just. Conversely, Aristotle deems unnatural exchanges, which are carried out with the intention of generating profit and thus imply a loss for one party, unjust. This is also reflected in his judgement of interest as being unjust; here the loaning of money is done with the sole intention of profit, which he writes is the most evident form of unnatural and therefore, unjust exchange (Younkins, 2005).

In summary, Aristotle's notion of the economy is predominantly that of one driven by normative ethics. It is evident that he recognized the importance of both personal and social fairness and tried to account for both of these in his work, though it has flaws which will be discussed in the next chapter.

Economic Thought in the Middle Ages (500 AD – 15th Century)

The Roman Empire and the early stages of the Middle Ages didn't bring along any noteworthy contributions to economic thought regarding the formation of prices. Scholasticism, the medieval way of thinking and teaching, was the next important step after Aristotle according to Söllner. It was formed on the basis of Aristotelian logic and the writings of the early Christian fathers. The main economic issues Scholasticism tackled were that of interest and justice in pricing. The ethically normative way of thinking is strongly reflected in the work of Thomas Aquinas, who is considered the most influential thinker of the Middle Ages and whose contributions are regarded as representative for the scholastic economy (De Wolf, 2003). While Thomas Aquinas' contributions generally follow Aristotle's reasoning, he makes, among others, the following innovations.

In assessing the value of a good, Aquinas speaks of the "just price" (Söllner, 2021). For him, the supply-side is seen as the deciding contributor to the value of a good and therefore the good's just price – it is set to at least cover the incurred costs during production of the good. In assessing its value, the individual needs of the parties involved in a trade are disregarded.

The just price, the good's value, is determined by the authorities, whereby the price is sometimes determined as a price range rather than a fixed price. Aquinas tolerates a moderate, or "just" amount of profit, so long as it is within the boundaries of a just price. The underlying objective is to set a price that distributes value evenly. The pursuit of profit involves charging unjust prices at the cost of others and is therefore condemned, or unjust.

For Aquinas the main role of money is to act as a standard of value, which is why he highly values monetary stability (Söllner, 2021). Charging interest is strictly forbidden, as, in addition to Aristotle's reasoning, it goes against his idea of the role of money. The exceptions to this rule were in the case of damage compensation for a damaged good, especially in the form of lost profit, and when repayment deadlines were failed to be met.

Towards the later phase of the Middle Ages, the interest ban was more and more undermined by skillful contract drafting and broad interpretation of the exceptions, which ultimately led to the repeal of interest bans (Söllner, 2021). It is in part due to this, that the strict social and economic structure was dissolved by the Late Middle Ages. The seeking of profit was gradually institutionalized by the development of double-entry bookkeeping, which blurred the boundaries between just prices and profit acquisition. The economic thinking was, by the Late Middle Ages, starting to separate itself from theological ideologies, and economic concepts were starting to be viewed in a more descriptive, non-normative manner.

In the Late Middle Ages, a relationship between the material value and purchasing power of money, specifically coinage, was made; a coin's value was dependent on the metal's value of which it was constructed (Söllner, 2021). Additionally, subjective value - and with it the demand-side of trade - was starting to be recognized and accounted for in price setting. The market price was therefore first seen as the fair price, as it encompasses the supply and demand of the entire market.

With regards to fairness, it can be said that scholastic economical thought is strongly shaped by the concept of social fairness that abides by the then prevalent social norms. The ultimate goal of scholasticism, which every economic activity is supposed to work towards, is to live a virtuous and God-pleasing life (Söllner, 2021). Personal fairness is overlooked, especially in the earlier stages of scholasticism dominated by Aquinas' way of thinking, where only the supply-side was considered in the formation of prices. Towards the end of the Late Middle Ages, personal fairness was beginning to be represented in economic ideas on the same level as social fairness.

Mercantilism (16th – 18th Century)

The Renaissance considerably sped up the changes that began in the Late Middle Ages; there was a flourishing of science and with the dissolving of scholastic dogmatics came the end of medieval hierarchies and feudalism, resulting in the consolidation of great European powers (Becchetti et al., 2019). The emerging school of thought during the 16th century was especially dominant in Europe and later referred to as Mercantilism. It was not a unified theory, but rather the result of a large number of different contributions with the common goal of supporting a nation's commercial activities.

The primary concern for mercantilists is increasing the wealth and power of their nation (Becchetti et al., 2019). This is achieved by increasing the quantity of gold and precious metals a country possessed, highlighting the importance of international trade. Nations used their wealth and military might to compete over the scarce resources. In line with increasing trade surplus, mercantilists support protectionism and colonial policies, which ultimately led to the formation of commercial corporations. In striving for increasing the money supply, the dangers of inflation are neglected due to their perceived harmlessness and inflation's function of boosting the economy.

Government interventions were seen as indispensable in reaching their economic goals and thus a strong emphasis was put on the state in their role of controlling the economy (Söllner, 2021). The idea of a free market was generally viewed with suspicion. However, the setting of prices and interest was not to be regulated to incentivize the strive for profit.

Mercantilism can be characterized by an empirical, analytical way of thinking. The economic goals of mercantilists reflect their idea of economics being as an independent science that is not bound by the ideologies of religion or the rigid ethics and morals of previous periods. As a result, they highly neglect any account for morals or ethics in the formation of prices. There is also no consensus on what determines value.

Physiocracy (17th – 18th Century)

Physiocracy is the first well-developed theory of economics (Dillard, 1949). It was developed by a number of French economists during the Age of Enlightenment who were upset with the regulation on trade brought upon by mercantilism. The ideas developed within this theory became extremely important for the future development of economics.

The key idea of physiocracy is that we ought to follow a natural order (Neill, 1949). In economic terms, physiocrats believe this order is marked by freedom and natural competition – the origin for the famous phrase “laissez faire”, translating to “let it be”. They hold that nature and the natural order leads society to the most optimal outcome.

The foundation of the physiocrats' economic theories was laid by a model explaining the circular flow of money, the “Tableau Economique” (Söllner, 2021). The model aimed to demonstrate how agriculture (which in the broader sense refers to the entire primary production, including mining, fishing, and forestry) was the primary source of a nation's wealth. The other 2 classes defined within the model, namely proprietors and artisans, do not generate profit due to the nature of competition. The economy was therefore designed in a way to profit farmers at the cost of trade. According to the Tableau Economique, the production of goods is the result of the surplus created from

agriculture, since the energy needed to produce goods derives from the energy that food provides man with.

The role of money is seen of that as an exchange medium and a means of production (Söllner, 2021). Physiocrats acknowledge the effects of inflation on money, which is why they believe in the acceptability of interest. They differentiate between the use value and exchange value, the former being equivalent to money, but fail to form a consistent value theory. In the setting of prices, physiocracy only looks at the supply-side. Prices are set around the “natural” price, which is inherent in their production costs. Agricultural goods, in line with their idea of following a natural order, are priced higher so as to profit farmers.

Their price setting is therefore justified by their idea of social fairness, to no extent do they account for the needs of the individual or personal fairness.

Classical Economics (1776 – 1870s)

The term “Classical Economics” is used to refer to the school of economics established by Adam Smith (Söllner, 2021). It began 1776 when Smith’s main work was published and dominated economic thought well into the 1870s. Although there are many who contributed to classical economics, it is Smith’s work that is considered most representative.

Smith distinguishes between the “natural” and market price. The natural price is dependent on the supply-side and is determined by the costs of production. It is natural, Smith claims, because it reflects the “real” value of a commodity – that is, its value when there is no government intervention and there exists barrier-free competition (Andrews, 2014). The market price on the other hand is determined by the supply-side *and* the demand-side. Due to competition, the market price always gravitates towards the natural price – a concept phrased by Smith as the “invisible hand” (Söllner, 2021). The natural price, therefore, guarantees the most efficient allocation of resources, leading to the best outcome for the individual as well as society as a whole. This, so he writes, can only be achieved in the absence of government intervention in the market. Smith therefore is a strong advocate of free trade; monopolies or anything that hinders competition should be counteracted.

Smith saw economics not as an isolated science, but rather viewed it as a discipline that is intertwined with politics and ethics. He was therefore interested in achieving a just price and intensively dealt with the concept of value. Like Aristoteles, he distinguishes between value in use and value in exchange in his famous statement of the “paradox of value”, or water-diamond paradox. In it he states that things that have little or no value in exchange, like water, often have a

much greater value in use than something with a high value of exchange, like a diamond (Carrier, 2013).

His concept of the natural and market price is reflected his two theories of value. The first theory, which he accepts and is generally welcomed during his time, holds that the natural or “real” value of a commodity is determined by the amount of labor required for its production (Becchetti et al., 2019). It is commonly referred to as the labor theory of value, or the objective value theory. The second theory, which wasn’t given much attention at the time, holds that value is determined through the exchange of goods, that is through the unregulated forces of supply and demand. This theory is commonly referred to as subjective value theory, as the value is determined by the subjective usefulness of a good to the individual.

On that account, Adam Smith’s labor value theory, the dominant theory in classical economics, leans on social fairness with regards to the pricing of goods - the demand-side and therefore personal fairness is neglected in the formation prices.

Neoclassical Economics (After 1870)

In the century following Smith economic science developed in line with his original ideas (Becchetti et al., 2019). During the span of 1870 and 1900 however, economic science underwent radical changes – this is referred to as the neoclassical revolution. In essence, the focus shifted from a macroeconomic perspective to the behavior of the individual.

Neoclassical economics assumes that consumers aim to maximize utility (Söllner, 2021). In contrast to the labor theory of value, consumers’ buying decisions are therefore determined by their individual perception of a good’s utility. The additional satisfaction or benefit the consumer gets from purchasing one unit of the commodity is referred to as marginal utility. As marginal utility can therefore change demand for a product and it is assumed that firms aim to adjust their supply to maximize profit, the market forces (demand for a product and supply of the product) determine the value of goods in the form of a market price.

Neoclassical economics therefore takes the individual’s needs into account when determining the value of a good, heavily leaning on Smith’s utility theory of value. Because the market equilibrium also implies the most efficient allocation of resources, given that the market is free from external interferences, neoclassical economics considers both personal and social fairness in assessing the value of a good.

Modern Perspective

Modern economics is still governed by the neoclassical paradigm. Though the paradigm has been sophisticated and further developed since its conception, the central propositions stated above remain at the heart of today's economics.

It comes to no surprise then, that today the market price is still the standard for determining the value of a good. The scholarly consensus is that the just price is generally the market price, except in extreme circumstances (Walsh & Lynch, 2001). The relevancy of the traditional just price as established by Aquinas during the age of Scholasticism is no longer seen as applicable or relevant; based on today's societal norms and morals, the just price has been worked out to be the market price – defining a just price beyond that scope is outdated and would defy economics as we understand it. It is clear why the market price is such a widely accepted approach to the just price. After all, it accounts for both personal and social fairness, which will now be briefly detailed more closely.

The key to today's markets and market prices is the concept of voluntary exchange, which ensures personal fairness. Every exchange in a market is voluntary. A voluntary exchange is a transaction both parties willingly agree to. Because modern economics assumes the rationality of agents, a voluntary exchange benefits both parties – that is, both parties in a transaction derive value from it. Take for example the transaction for an apple, which is purchased for 1\$. The buyer valued the apple more than the 1\$ she gave up for it, and the seller valued the 1\$ more than the apple. The exchange therefore is mutually beneficial, and the price is considered personally fair.

A further defining characteristic of markets is that they incentivize the efficient allocation of scarce resources towards their most efficient use, ensuring social fairness; if farmers produce too many apples, the price will fall as sellers try to sell them off. These lower prices lead to a reduction in profit, which incentivizes farmers to produce more of something else – something that yields a higher profit, which conveniently is something that is in high demand. This market mechanism ultimately leads to the best outcome for society with regards to the allocation of its resources, which is why the market price is considered to be socially fair. This is called the Pareto optimum, where all parties reap a benefit (Söllner, 2021).

Additionally, economic theory states that an ideal market operates under so-called "perfect competition". Perfect competition in a market implies that all sellers sell the same product, individual sellers can't influence the market price on their own, there are no entry or exit barriers, and buyers have full information about the goods being sold. In a market operating under perfect

competition, there can therefore be no price gouging or any other form of exploitation of the consumer. This contributes to the well-being of society and further emphasizes social fairness.

Another way in which neoclassical economics aims to maximize social welfare is through government interventions. Although economists today support unregulated trade for most markets, there still exists some government intervention. For example, in cases where the consumption or production of a good creates negative effects on third parties, so called negative externalities, the government raises the price of this good so as to reduce demand and with it the negative impact on society. Examples for these goods include demerit goods, such as cigarettes. Likewise, the government will intervene in the market for public goods to make them accessible to all members of society. Examples for these include national defense, drinking water, and public transport.

The modern perspective of the just price therefore effectively considers both personal and social fairness and the author believes that it can, in accordance with today's societal norms, be seen as a more holistic and convincing approach to justice in pricing than historic ones.

Critical Evaluation

The previous section demonstrates how the just price developed throughout history to finally be, generally speaking, the market price. While economists are happy with this definition, there still exists the intuition of injustice in pricing indicating that a normative analysis of price is still relevant. Elegido (2015) identifies five conceptions of the just price that have been put forth in recent years. This section aims to critically evaluate these in terms of their relevance and applicability to today's circumstances.

Objective Price

The scholastic approach that the just price roughly equates to the production costs of a good and is therefore the objective price inherent in the good is still held by some scholars (Langholm, 1992; Monsalve, 2010). This pricing approach will be referred to as the objective price. The issues facing the objective price are evident.

For one, the objective price highly favors either the seller or the buyer depending on the circumstance. Suppose for example a producer creates a new smartphone with revolutionary features for which buyers are willing to pay 2000\$ but the production costs lie only at 500\$ per unit. Following the objective price, the buyer will reap the full benefits of the value created by the producer, that is 1500\$, while the innovator, who produced the value is not rewarded for the created value. Suppose again the same producer put a lot of resources into research and development to create a new device that does not end up being desired and for which buyers are

willing to pay 500\$ while the production costs lie at 2000\$ per unit. Following the theory of the objective price, the costs of production - however high they may be - are fully transferred to the buyer, which strongly violates the idea of personal fairness.

The objective price approach may therefore disincentivize producers to create value through innovations. This is neither good for the buyers, nor can it be seen as beneficial for society as a whole. Therefore, this approach is not in society's interest and can be seen as socially unfair.

Walsh and Lynch further criticize the objective price in that it only considers the supply-side of things in the formation of a price. The buyer's needs are not accounted for whatsoever, which makes it difficult to apply this approach to any situation where the buyer values the good differently than the price suggested by the objective price. This distinction can be regarded as the distinction between the true and fair, or the objective and just price.

Economists nowadays recognize the weaknesses of this approach, as they reject the very notion that there exists a natural, true, or objective price inherent in a commodity (Walsh & Lynch, 2001). While it may have been a good approach during medieval times, it neither convincingly supports social nor personal justice in today's circumstances.

Voluntary Exchange Price

Michel (1999) takes an Aristotelian approach in defining the just price in that he describes the just price as "as one that is agreed upon in the course of a voluntary transaction". Because such a transaction is the result of a genuine agreement that was not made under coercion, it can be seen as equivalent to Aristotle's natural exchange where profit is not the primary motive. We will call the price determined by voluntary exchange the voluntary exchange price.

Elegido does a good job at illustrating why Michel's idea is problematic. He does this by laying out two scenarios in which the voluntary exchange price can be regarded as morally wrong. In the first scenario, an agreement is made to lend a jacket for one hour in exchange for 1.000\$. The exchange is voluntary, but only because the person agreeing to pay 1.000\$ was in a situation of desperate and immediate need of a jacket for a job interview.

The second scenario involves an illiterate and inexperienced villager who sold his entire property and moves to a big city in a developing country. There he makes a deal with his new 'friend' to buy a bicycle at an unreasonably high price after his friend had falsely convinced him that having a bicycle is crucial in the city.

In both cases the voluntary exchange price is hard to defend as being just, neither by today's norms nor by Aristotle's definition of a natural exchange, because they are highly exploitative. The

voluntary exchange price therefore isn't widely recognized today as being a reliable way of determining a just price. There are situations in which it defies the idea of social fairness and although it could be considered personally fair, it does not account for exploitation.

Non-Exploitative Price

Valdman (2009) accepts the shortcomings of the voluntary exchange price and leans on non-exploitative prices as the standard for forming just prices. A non-exploitative price, he writes, is one that "falls into a range bounded by the lowest amount that a seller would accept and the highest amount that a buyer would pay if both were informed and neither had unacceptable non-transaction costs", where non-transaction costs are "cost[s] incurred by refusing to accept an offer". An acceptable non-transaction cost occurs when rejecting it does not render oneself unable to satisfy an urgent need and whose non-satisfaction would mean being put in a position where one could not live "a decent life".

While this conceptualization does eliminate the possibility of exploitation within a voluntary exchange, Elegido identifies two shortcomings. The first has to do with the definition of "a decent life", which leaves room for interpretation.

The second shortcoming lies in the range bound by the lowest amount that a seller would accept and the highest amount that a buyer would pay. This range, depending on the circumstance, could be extremely large. Suppose for example you invent a new printer ink with a total production cost of 50\$ per liter that replaces another printer ink priced at 500\$ per liter, doing just as good a job at printing. As per Valdman's definition, a non-exploitative and therefore just price could be any price between the range of 50\$ and 500\$. Not only is this a huge range, but it can be questioned as to whether it is right to assume that every price within this range is equally just.

Therefore, while one could argue in favor of this approach's social and personal fairness, it is a vague concept with too much room for interpretation and misjudgment, which makes it hard to determine just prices.

Distributive Justice Price

Frank's (1988) definition of an operationally just transaction is one "in which the surplus divided (approximately) evenly". This will be referred to as the distributive justice price, as it to some extent aligns with Aristotle's theory of distributive justice. Frank claims that the further the transaction deviates from the buyer's and seller's reservation prices, the more unfair the transaction becomes. Their reservation prices he defines as the highest price the buyer and the lowest price the seller would agree to. In the scenario with the printer ink, their reservation prices would be 500\$ for the

buyer and 50\$ for the seller per liter of ink, respectively. Frank's distributive justice price then suggests the just price to be (approximately) 275\$.

As is the case with the objective price, Elegido points out that the distributive justice price fails to do justice to the producer in cases of innovation. The buyer no longer reaps the full benefit of the value created by the innovator, but instead this value will be equally divided between the producer and the buyer. In the printer ink example, the buyer would receive 225\$ of value per liter of printer ink he purchases for free while the innovator only receives half of their created value, 225\$ instead of 450\$. Considering a transaction like this fair would be questionable. In fact, Frank himself acknowledges this flaw and states that a better theory would have to account for the contribution towards the value creation in the calculation of a just price.

A further crucial flaw to Frank's distributive justice price, as Elegido notes, is that it does not consider the buyer's background circumstances – circumstances over which the seller has no influence. As Frank's theory is based on the value *the particular buyer* derives from the transaction, the derived just price could vary greatly depending on the buyer's individual background circumstances. In cases of special need for example, the buyer's utility derived from the transaction may be artificially high, therefore raising the just price, essentially handing over free money - or distributed value - to the seller. As the seller has no influence over the buyer's background circumstances which the distributive justice price gives great importance to in determining the just price, it is safe to call regard this as a flaw of Frank's theory.

With regards to the non-exploitative price, one could therefore make the case for the distributive justice price encompassing both social and personal fairness. However, there are crucial flaws to this pricing strategy, even if it were possible to always accurately determine one's reservation prices (which the author believes to be infeasible in the first place).

Market Price

All of the shortcomings and criticisms listed above are resolved in the neoclassical market price approach, according to which the just price is the price obtained in a free market. The one exception here that Elegido points out is that of the value creation through innovation. While the innovator will indeed be fully rewarded for her value creation, this extra value will eventually be lost when the competition forces prices back down. How soon this will happen and how much extra value the innovator creates depends on her competitor's ability to imitate the innovation, over which the innovator herself has little and sometimes even no control. In the printer ink example, the seller would reap the full benefit of value creation, 450\$, until the competition learns how to replicate the new ink and forces prices to go down. However, the author doesn't deem this a strong shortcoming,

because an innovation that creates a large amount of extra value is usually simultaneously more difficult to imitate. The market price therefore is the most solid method we have for deriving at the just price – it fulfills both the personal and social components of justice.

Why then is there still the notion of injustice in pricing? The biggest flaw of this approach lies with the assumption of perfect competition, a purely theoretical concept which neoclassicism is founded on. Unsurprisingly, the theoretical models of neoclassicism are often said to be oversimplifications and therefore unrepresentative of the real world. A market operating in perfect condition in the real world is practically impossible.

Perfect competition implies a set of conditions that have to be met. A rather troublesome one is that of the “homo economicus”, translating to economic man (Levitt & List, 2008). Homo economicus assumes perfect rationality, meaning that people will always choose the outcome that provides them the highest value. This implies that the homo economicus has perfect information that he can use to solve difficult optimization problems to serve his self-interest. In the context of a market this means that the consumer has perfect information over it and will only purchase an item if she perceives its value to be greater than the market price, maximizing utility. Many behavioral economists and social scientists however reject the existence of the homo economicus, as they believe humans are reciprocal and altruistic creatures (Yamagishi et al., 2014). Countless studies show evidence against the homo economicus with the help of experimental economic games, such as the ultimatum game or the dictator game. Furthermore, assuming that every person has perfect information in a market is questionable and most often not true.

Firms being price-takers is another significant condition in the perfect competition assumption. Being a price-taker means that one does not have enough market share to individually influence the price a good, rather one must “take the market price” as is. This is often not the case in the real world, as firms hold a lot of market share and therefore power in certain markets. The classic example is that of a monopoly. Since economics as we know it today is built on the idea of perfect competition, which is a theoretical concept that doesn’t hold true in the real world, many point this out to be a major flaw of the market price.

Another argument often put forth against the market price standard is that of price-gouging. In the case of a famine, for example, the price for food will often rise to levels that are considered unfair due to reduced supply. Here the market price produces a price that many people consider unjust. Researchers attribute this to the fact that consumers consider price references, such as past prices or competitor prices, in their assessment of a fair price (Bolton et al., 2003; Campbell, 1999; Giellissen et al., 2008). Walsh and Lynch therefore suggest the market price approach only in

circumstances where the market price isn't more than double or less than half of the conventional market price. They call this the conventionalist approach – the just price is determined by the conventional market price, that is, the price of as determined in previous transactions. This does however introduce new problems which will not be dealt with in this paper.

It is clear then, that in cases of special need, such as a famine or drought, the market price cannot form a just price. The market then relies on government interventions. These extreme cases however are relatively minimal in scale and therefore the author doesn't view this as a strong disadvantage. Another case in which the government intervenes is in that of the market for life-saving drugs, or human organs. The pharmaceutical industry however brings about many ethical issues which extend beyond the scope of this paper. For now, it can be said that ethics demand that the pharmaceutical industry be handled by the government – our societal norms imply that the market price does not lead to a just price in this industry. To which degree government interventions increase price fairness is also heavily debated.

Regardless of its shortcomings, the market price – in theory - remains the best approach we have to achieving just prices. However, it is purely theoretical and close to impossible to effectively exercise in the real world. The following section discusses the pricing strategies that firms are actually using to price their products.

Pricing Strategies

As evident from the previous section, there exist a number of different ways to price products. Although these vary considerably across industries, countries and markets, scholars generally agree that these pricing strategies can be categorized into three groups (Hinterhuber, 2008).

Cost-Based Pricing Strategies

As the name suggests, cost-based pricing strategies are based on the costs associated with the production of a product (Riserbato, 2021). These are referred to as production costs and are the sum of all direct and indirect costs a firm faces through manufacturing a product or providing a service (Hayes, 2021). These can include the costs associated with labor, materials, consumable manufacturing supplies, and general overhead. The product's final price is then based around the sum of these costs.

The most popular cost-based pricing strategy is the cost-plus strategy, where the price is determined by adding a percentage on top of the production costs (Carlson, 2021). This percentage is referred to as markup and is the profit the firm generates by selling the product or service. To calculate the price of a product or service using this strategy, one must first determine the unit cost. The unit cost

refers to the production costs of one single unit and include both fixed and variable costs. The unit cost is then multiplied by the markup percentage to arrive at the selling price to the customer.

This strategy is best illustrated in the context of a simplified example. Suppose farmer A grows apples. In the production of one apple, he incurs a cost of 1\$. The farmer decides on a markup of 50%. The price he charges for an apple is calculated by multiplying the unit cost by the markup and therefore 1.50\$. This means that for every apple he sells, farmer A generates a profit of 0.50\$.

The main advantage of this strategy is that it guarantees profit on every sold unit – firms are guaranteed not to make a loss with the sale of a product or service. This makes it easy for firms to plan ahead and also gives them a sense of security. The farmer can therefore be sure to be generating profit as long as his apples are in demand.

Further, and this is especially relevant in the example with the farmer, this strategy is simple to use - one does not require deep knowledge to apply it. Farmer A, who specializes in the production of apples, need not hire a third party to determine the price.

However, the cost-plus pricing strategy does not consider the competition. If, for example, competing farmers offer their apples at a price of 1.1\$, demand for farmer A's apples sinks and the profitability of his operation declines. Competing farmers could also be offering their apples at a price of 2\$, losing farmer A potential profits because of charging too low.

On a similar note, this pricing strategy fails to take customers' willingness to pay into account. Suppose customers were only willing to pay 0.5\$ for an apple. Because farmer A does not account for that in his price, he will get fewer sales.

Hinterhuber acknowledges cost-based pricing strategies to be the weakest in terms of profitability. However, due to its similarities with the scholastic approach of the objective price that is inherent in a product, they face the same issues with regards to justice in pricing as the already discussed objective price. The author therefore deems cost-based pricing strategies suboptimal.

Value-Based Pricing Strategies

In value-based pricing the prices are set based on consumers' perceived value of a product or service. It is therefore a customer-focused pricing strategy – firms gauge the perceived value of their product to the customer and price accordingly (Cross & Dixit, 2005). However, currently most pricing is still cost-based with a focus on the product, as opposed to the customer. Hinterhuber finds that only 17% of practiced pricing approaches are value-based as of 2007. A more recent study by Liozu (2017) suggests that only 25% of firms implement value-based pricing strategies. The persistent low adoption rate of this pricing strategy is primarily due to the complicated process the strategy entails,

as well as a lack of clarity about what value-based pricing even is. However, value-based pricing is regarded in scholarly literature to be the best pricing method not only the profitability, but also for customers.

A value-based pricing strategy can only lead to a profitable outcome if the product or service at hand sets itself apart from the competition and if the product creates value to the consumer (Steinbrenner & Turčínková, 2021). If the product doesn't set itself apart from the competition, that is, if there isn't a brand advantage that a product has over its competition, one is better off using another pricing strategy. Further conditions that favor the use of a value-based pricing strategy is an inelastic demand and having a relatively high price point.

An example that perfectly matches these criteria is housing. Beltis (2021) describes the real estate market as a "seller's market" where consumers are often paying much more than the house's original asking price. The fashion industry is also heavily characterized by value-based pricing strategies, especially popular brand designers. These often try to increase the perceived value of their products by consumers, so as to increase the selling price.

To successfully adopt value-based pricing, firms must in a first step engage in value creation, and most importantly follow it up by value extraction (Cross & Dixit, 2005). Value creation consists of creating value as perceived by the consumer, whereas value extraction is the process of reaping those benefits. Only when the customer has agreed to the value proposition and pays for it does the effort of value creation get results.

To create value, companies constantly tailor their products or services to match the needs of consumers, which has proven to be difficult - identifying properties that consumers value is not an easy task (Nagle & Müller, 2018). Products are often designed in a way that seem innovative and value-creating to the company selling the product. However, the pricing strategy may fail if they cannot convey this value to the consumer. As such, it is important for firms to stay in touch with the market which they wish to address. It is often the task of the marketing department to conduct market research with the aim of identifying needs and values of the customer.

Once the value has been created, the value should be extracted from the customer. Setting customer-centric prices that reflect their perceived value of a product is key for this. As such, the price for a product under a successful value-based approach is constantly changing to reflect changing market variables (Cross & Dixit, 2005). Hayek (1945) identifies these market variables to be, among others, brand preference, the availability of supply, and product substitutes.

However, as consumers have individual values associated to a product, it is important to segment the market into different so-called customer segments. Customers are hereby segmented into groups with similar perceptions of value and willingness to pay, for which prices are charged accordingly (Cross & Dixit, 2005). The segmentation of customers is a complicated process that needs to consider many different factors. Firms may customize their product to fit the needs of specific customer groups, by adding or removing certain features or attributes.

The continuous assessment of product attributes, customer perceptions, and the circumstances that are presented by time and place are further decision variables which must be considered in customer-oriented pricing. For example, airlines sell tickets at highly different prices depending on the time at which the tickets are sold. According to Maxwell's definition of a social fairness, these are socially unfair prices. The author however holds that, under the assumption that they have the option to purchase their tickets earlier and from other airlines at a similar price, the customers who pay a premium to get a ticket in the last moment are willing to agree to the transaction, because they value the ticket at that price. Would they feel unfairly treated, they would buy the ticket sooner or book for another time. It is therefore their own choice to purchase the ticket at a higher price and therefore it does not conflict with the author's idea of a socially fair price.

In an attempt to align product prices with customer's perceptions of value, firms often conduct surveys or gather information through customer focus groups (Cross & Dixit, 2005). However, customers are not able to reliably predict their exact purchasing decisions until they are then actually faced with the decision. As such, the results of these surveys or focus groups may be biased. For example, the company Philips conducted a focus group to assess their preferred color of boom boxes. Although most participants voted for yellow, when given the choice between receiving a yellow or black boombox, the majority of the participants chose the black one.

Ultimately however, the value-based pricing strategy is a step toward a pareto optimal as both producers and consumers benefit from it. Customer-centric pricing assures that a product's value is accurately captured through the price mechanism, that is the market price. Producers increase their profits while consumers get what they want at the price that they value it at. Price-insensitive customers might receive additional value in the form of for example a higher degree of reliability, or the access to a product at the last minute. Price-sensitive customers on the other hand are able to pay less by not getting certain product features or attributes. The market price falls under this category of value-based pricing strategies.

Value-based pricing leads to prices that can be seen as personally fair and, depending on one's definition of social fairness, also socially fair. The author sees value-based pricing as both socially and personally fair and therefore deems it considerably more just than cost-based pricing.

Competition-Based Pricing

As opposed to cost-plus pricing where the price is based on production costs and value-based pricing where the price is based on consumers' needs, competition-based pricing bases its prices on the prices of the competition (Guo, 2021). For this, a firm mainly relies on the publicly available information about the prices of its competitors. When talking about competition, it is important to note that it refers to products of competing companies which are offering a similar product.

This pricing strategy uses competitor's prices as a benchmark. Therefore, as a business grows or as competitors' prices change, so does the price one sets with this strategy (Hart, 2020). In fact, unlike with the cost-plus or value-based pricing strategies, there is nothing concrete that dictates a price or a price range that a firm practicing this pricing strategy must adhere to. Based on the prices of the competitors, the firm can somewhat arbitrarily decide to price below the competition, above them, or match their price. This decision can be influenced by many different factors and isn't bound by any rules or best practices, which is why this pricing strategy can be referred to as arbitrary pricing.

The advantages of competition-based pricing lie in its simplicity and its low risk. The data on competitor's prices is publicly available, meaning that one does not have to go through a rigorous process to derive at a price. Furthermore, if the price is based around the price of the competition, it is fairly safe to assume that the price is appropriate, considering that it is working for the competition.

However, Hinterhuber criticizes this approach for its lack of customer focus, which leads to loss of the potential opportunities presented by a customer-oriented strategy. Furthermore, this strategy doesn't take the long-term goals into account – it is only a short-term solution. Hinterhuber only recommends this strategy for low-cost commodities under the condition that these are close to identical and thus cannot be differentiated from one another.

Impact of Information Technology on Pricing Strategies

The internet and the rise of information technology brought about fundamental changes in pricing strategies (Soman & Gourville, 2001). Dixit et. al (2005) identify three main factors brought about by IT that influence pricing strategies: increased availability of information, enhanced reach, and expanding interactivity. These will now be discussed in further detail.

Increased Availability of Information

Firms leverage IT to improve the gathering, handling, and analysis of pricing information. Huge amounts of data, often referred to as big data, enable many pricing strategies. These include price customization, bundling and unbundling, revenue management, automated pricing, and segmented pricing. As an example, with the help of big data consumers can be segmented into markets based on similarities of their expected price levels, willingness to pay, price sensitivity, brand utility, and many other factors that influence their buying behavior. This information can then be used to determine the optimal price for each market segment or customize the product accordingly. Because of how technology has advanced, we are now able to apply thousands of pricing algorithms within a second.

Although IT improves the transparency of markets in regard to costs and prices, it is the firms which have access to more sophisticated search tools and critical information on their customers and competition. This can enable them to better forecast the demand for their products and thus increase price discrimination. Companies like Amazon invest a lot in these advanced search tools, which highlights their importance.

Enhanced Reach

Various pricing strategies are greatly augmented by the enhanced reach IT enables. These include auctions, revenue management, bundling and unbundling, and price customization. The internet gives firms access to a greatly extended world of new customers and markets. Online auctions for example create a market that is not constrained by geographical location, time, or space. Customers from all over the world can participate in these online auctions and automated, smart agents enable them to monitor and participate in several auctions at once. Not only do online auctions increase demand, they also open new markets, alter consumer behavior, and change the perceived value of products. In fact, products that are highly demanded are estimated to be priced between 17% and 45% higher online than offline, because the increased reach yields a higher probability of finding a buyer who is willing to pay more.

Expanding Interactivity

Another way IT influences pricing strategies is through the increased efficiency achieved by electronic transactions and online customer interactions. These online interactions cause buyers and sellers to group together through exchanges such as maintenance, repair, and operation hubs. Through the matching of buyers with suppliers and demand aggregation, buyers receive a better price and suppliers receive more volume – a beneficial situation for both. Due to the effects of the

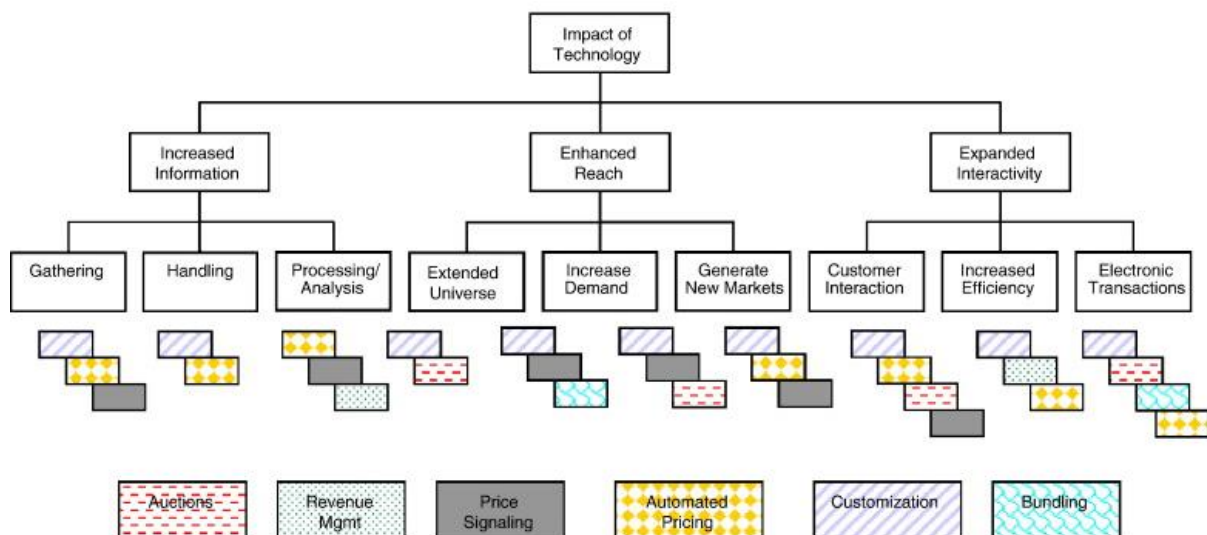
opponents and the so-called quasi-endowments of online auctions, behaviors may differ from those of traditional markets.

Through the use of advanced search agents such as search bots, buyers are able to make price comparisons much more easily and therefore actively seek out deals. Firms use different pricing strategies such as versioning, auctions, or group buying programs to counteract this by increasing the value of their products to the customers. As an example, revenue management may unload excess supply to allocate it towards different customer segments.

To summarize, the advancements in information technology and their implications on pricing strategies can be boiled down to the following three factors. For one, advancements in IT provide firms with more information about their customers, which enables them to apply pricing strategies such as revenue management or online auctions. The advancement of intelligent agents furthermore gives companies more information on their competition, through which they can leverage automatic pricing and online price signals to gain a competitive edge. Finally, interaction through digital markets allows for more room in the customization of products. These effects are summarized in Figure 1.

Figure 1

Impact of information technology on pricing strategies (Dixit et al., 2008)



Shift From Products to Services

Additionally, the author identifies the transition from products to services as a phenomenon greatly impacting pricing strategies. The greater awareness of customer needs and more well-connected communities that have been brought about by advancements in IT and the digital economy enable companies to focus their attention on services rather than products. The focus on value-adding services allows companies to remain competitive and achieve higher profits by better addressing the needs of the customer (Vickers & Merkofer, n.d.). Customers often do not want to own devices or maintain and manage these by themselves. Instead, they often prefer to outsource the management and maintenance to the owner or service providers.

When buying a car for instance, it is generally not the ownership of the car that people seek, but rather the ability to travel from one place to another. Using a car sharing service will come as much cheaper and more convenient to many customers, who perhaps do not frequently need a car.

The transition from products to services makes pricing more difficult. This is due to the intangibility of services and the wide range of outcomes that services can have (Docters et al., 2004). For example, counting the units sold of a service may prove to be more complicated than with a product. Cars for example are generally sold by the vehicle, but online information systems can be sold by the minute, the web page, the file, the search, or by time of day. The irreplaceability of services also adds a layer of complexity on pricing because one has to consider the costs of failure. Services, unlike products that can be replaced or fixed, are in no way replaceable. The costs of failure - for example the outage of a server - often far outweigh the actual price of the service.

IT-Enhanced Pricing Strategies (ITEPS)

The previous section focused on how pricing strategies were impacted by the development of information technology. This section will discuss pricing strategies that have been enhanced through these recent technological advancements. Dixit et. al (2008) identify six IT-enhanced pricing strategies and categorize them into the differential, competitive, and product line pricing strategies.

Differential Pricing Strategies

Tellis (1986) classifies differential pricing strategies as those which sell the same product to consumers at different prices. This is possible due to the heterogeneity of customers and is often referred to as discriminatory pricing, or price discrimination. The lower transaction costs, increased demand, and easier search capabilities brought about by the internet facilitates differential pricing strategies (Dixit et. al, 2008).

Internet Auctions

Auctions are price discovery mechanisms in that the prices are determined through a bidding process (Dixit et. al, 2008). Online auctions usually reach a greater number of users and are characterized by significantly lower transaction costs and increased interactivity than live ones. Dixit et. al distinguish between forward, reverse, and anticipatory auctions.

Forward auctions consist of multiple buyers competing over items from a single seller. These auctions start with the lowest possible price upon which buyers compete against one another by gradually bidding higher values. The highest bidder wins the auction, which means receiving the goods or services provided by the seller in compensation for the placed bid. A popular online platform on which forward auctions are commonly held is eBay.

Reverse auctions are auctions in which the roles of seller and buyer are reversed; multiple sellers compete over the business of one single buyer. The buyer states what she desires, and sellers compete against one another to sell their goods or services to that buyer by offering their price. The buyer is free to choose whichever offer she receives.

Anticipatory auctions are used when firms want to measure a product's price sensitivity and demand. They do this by creating hypothetical situations in which customers place bids for products or services but are not required to purchase them. This was used for example by Cathay Pacific Airlines to determine the value of flight tickets from New York. Based on the results of the auction, the airline adapted ticket prices to optimize future revenues.

Revenue Management

Revenue management predicts consumer behavior to match demand and supply and ultimately maximize revenue growth ("Revenue Management", 2021). This is achieved by understanding how consumers perceive the value of products and accurately aligning prices, placement, and availability of products for each customer segment. In other words, the aim of revenue management is to sell the most suited product to the specific customer at the best time for the right price to maximize profit.

Naturally, this pricing strategy is heavily reliant on large amounts of data to understand customer needs and behaviors. It comes to no surprise then, that this pricing strategy is enabled primarily through the use of IT, through which data can much more accurately, efficiently, and in larger quantities be stored, retrieved, and analyzed. Revenue management requires the segmentation of customers, the dynamic pricing of goods and services, and accurate demand forecasting. All these are made possible by big data and information technology.

Many industries use revenue management to determine prices and maximize profit, one of which being the hotel industry - most hotels use revenue management to determine their prices ("Hotel Revenue Management", 2021). For instance, hotels that are located near a festival venue will commonly raise their prices during the festive season. Although highly simplified in this example, this is a form of revenue management.

Competitive Pricing Strategies

Dixit et. al define competitive pricing strategies as those that depend on the firm's competitive position. Prices are primarily determined by evaluating customer behavior, price and product perceptions, and responses to changes of competitors' prices. While competitive advantages were traditionally achieved by factors such as location or size, online competitive advantage are created primarily through the acquisition of relevant data, a customer-centric approach, and dynamic capabilities.

Online Signaling

Online signals are the messages conveyed to consumers about the quality of a product and the firm's reliability (Mavlanova et al., 2012). The most common signal is a price signal, which communicates a product's selling price. Consumers tend to evaluate high prices as a signal of better quality; that is, the evaluated quality of a product increases together with its price (Tellis, 1986).

When shopping over the internet, these evaluations are more difficult to make; while the quality of a product is generally observable and verifiable during the selection process at traditional stores, there exists information asymmetry in e-stores because consumers cannot physically evaluate the quality of products (Mavlanova et al., 2012). This is due to the time lag and distance gap that online shopping brings about. Sellers can abuse this information asymmetry by overstating or exaggerating the quality of their products and therefore blur the boundaries between products of high and low quality.

Furthermore, online signaling needs to consider the increased availability and ease of access to information provided by the internet. Buyers usually have access to much more information about the product they are looking to purchase when shopping online as opposed to shopping traditionally.

Therefore, sellers need to make use of different online signals when selling their products over the internet to convey quality to the consumer. These include for instance money-back guarantees, privacy statements, website designs, third-party seals, customer support, positive reviews, or physical store locators.

Automated Pricing

Advancements in IT enable sellers to continuously measure demand to respond quickly to market trends by monitoring consumers demand dynamically in real time (Dixit et al., 2008). With the additional ease of changing prices digitally and the availability of analytical tools for dynamic demand data (Mavlanova et al., 2012), it is evident why automated pricing is common nowadays.

These price adjustments consider price moves by competitors, such as to attract as many buyers as possible (Oh & Lucas, 2006). This is made possible by the increased transparency, as in the increased availability of price information the internet offers – both for sellers and buyers. Other factors that are considered in automated pricing include the type of product, the amount by which its price is adjusted, the frequency of price adjustments, and the privacy or transparency of one's pricing policy. These are important questions the seller must ask herself, because consumers may feel unfairly treated if automated pricing strategies are not exercised cautiously. Frequent price increases and untransparent pricing policies may increase the information asymmetry between seller and buyer to a point where the buyer feels exploited.

Product Line Pricing Strategies

Information goods have different cost economies, intermediation mechanisms and distribution modes, which creates unique pricing mechanisms (Dixit et al., 2008). Specifically, product bundling and customization are especially relevant in this context. This enables firms to create more value for their customers while increasing profits.

Product and Price Customization

The foundational concept of product and price customization is that buyers have a different willingness to pay for similar products (Brasz, 2018). This results in cross- and upsell options which enable the customization of the product and price to fully capture the customer value. This pricing strategy is strongly enhanced by the digitization of transactions and the existence of information goods.

When ordering food online or via digital screens for instance, each customer is presented with customization options such as toppings, sides, or drinks. Based on the customers' needs and willingness to pay, each customer will choose her own customized product, and price. Based on the consumer's choices, she is often recommended certain addons or alternative choices, which often leads to increased customization when compared to traditional transactions. Similarly, when purchasing software, consumers are often able to choose between a number of different licensing options, resulting in a customized product and price for each buyer.

Product Bundling

Product bundling is a pricing strategy that offers several products or services packaged as one product ("Product Bundling", 2021). The distribution of digital information goods has dramatically enhanced and popularized this pricing strategy (Bakos & Brynjolfsson, 2000). This is due to the immensely low marginal costs of information goods when compared to physical goods.

This pricing strategy results in higher sales and profit for the seller, and often also increases customer value; bundles often cost less than the sum of each item packaged in the bundle (Bakos & Brynjolfsson, 2000). Consider the product bundle of calendar software and a schedule planning software with intertwined functionalities. Consumer A values the calendar software at 50\$ and the schedule planning software at 100\$, while consumer B values them at 100\$ and 50\$ respectively. In order for the seller to sell all products to both consumers at equal prices the seller would have to charge 50\$ for each software, resulting in a revenue of 200\$. Through bundling however, the seller can receive a revenue of 280\$ by pricing the product bundle consisting of both software at 140\$, which both consumers are willing to pay. This bundle benefits both the seller and the consumers. As software is an information good, the marginal cost to the seller is close to zero.

Dynamic Pricing in the Airline Industry

Dynamic pricing is an umbrella term for all pricing strategies that utilize variable prices instead of fixed ones (Campbell, 2022). The previously discussed pricing strategies can therefore all situationally be considered forms of dynamic pricing. There is no consensus in the literature and by academics upon the exact definition and mechanisms behind the term dynamic pricing, although some researchers such as Wittman and Belobaba (2019) have published a definitional framework for dynamic pricing in specific industries. The core aim of dynamic pricing however is to sell the same product at different prices to different customer segments. This is achieved through variable prices that change dynamically based on factors such as time, location, day of the week, consumer demand and behavior, competitor prices, or method of purchase. Anything that falls under this definition will be regarded as a form of dynamic pricing throughout this chapter for the sake of simplicity.

With the increased data on consumer behavior and demand, the ease of changing, and the availability of decision support tools that are all made possible through the advancements in IT, dynamic pricing is becoming increasingly popular (Elmaghraby & Keskinocak, 2003). Companies require large amounts of data on their customers to effectively determine dynamic prices which was not feasible before the onset of IT. Both in e-commerce and in physical stores, companies are now able to collect information about their sales and their customers as well as their preferences to implement dynamic pricing to their advantage. Naturally, many industries today are leveraging

dynamic pricing to maximize their profits and match their prices to relevant circumstances. This section will take a closer look into the airline industry.

Most commonly, airlines have been using static pricing strategies to price their services in the past ("Dynamic Pricing Strategy for Airlines", 2021). Fare structures were created using a very limited number of price points. Today's technology advancements and data-driven capabilities have enabled airlines to leverage dynamic pricing strategies to better personalize and optimize their prices to the customer to generate more profits.

Nowadays, anyone looking to plan a trip abroad or find cheap flights will immediately notice the constantly changing fare prices. American Airlines for instance change up to 500.000 prices every day (AltexSoft, 2019). As such, the price for the same seat class in the same flight can fluctuate multiple times, even during the span of a day. While these price changes may be frustrating and seemingly random to the consumer, they are the result of complex machine learning and data analytic techniques.

To understand the variable prices in the airline industry, it is first important to realize that airlines, just like any other business, aim to maximize profits. For airlines this means that they have to sell off as many seats as possible for a flight, and at the same time for the highest possible price. This is because it would be inefficient for a plane to take off with only a few expensive tickets sold, just as occupying the entire plane with low costs per seat would not lead to the most profitable outcome. Revenue managers therefore have to find the right balance between the highest seat price and the highest aircraft occupancy - price and quantity (AltexSoft, 2019).

For revenue managers to reach this balance, they must first understand their customers. Carriers track customer purchasing behavior under the assumption that they are divided into two main customer segments: leisure and business travelers (AltexSoft, 2019). Leisure travelers are price-sensitive and plan their trips in advance, as they are not locked in on a date or schedule. Business travelers on the other hand often have to book their flights on short notice and must reach their destination on time and on a fixed date. Therefore, they will generally pay a much higher price to travel on a specific day, especially since their travel expenditures are usually covered by their employer. This leads to business travelers generally booking only days before departure. For airlines to efficiently engage both customer segments and increase their sales and profits, they must therefore sell their tickets at a lower cost to leisure travelers and at a higher cost to business travelers. That is why flight fares usually remained constant at a discounted price for months before a departure and then started rising in multiple steps as the departure date came closer. This

difference between fares is what airlines have been using to help divide their customers in leisure and business travelers in the past.

With the advancements in IT, the fare prices now additionally dynamically react to demand. This is best explained with the context of an example. Suppose there are fifty economy class seats on the aircraft of a given flight. Although these seats all belong to the same class, the airline wants to sell them at different prices to maximize their profits. To do this, carriers divide these fifty seats into multiple fare groups, called buckets (AltexSoft, 2019). For example, there will only be ten seats at the lowest fare bucket with minimum services and the lowest bag allowances. Once these ten seats are sold the bucket is closed and customers can no longer purchase a seat at that bargain price. But forty seats with more services and higher bag allowances are still available at a higher cost in the remaining buckets, which will also start filling up and gradually close. This is where advanced IT tools come into play. Currently, the bucket system makes for gradually increasing prices. However, if this were the case, prices would consistently increase over time as buckets are filled. If the only price direction was up, airlines would lose a lot of price sensitive customers. That is why airlines further track demand to determine how fast the buckets get filled. Suppose the airline sold the ten seats from the first bucket in a week, but then only a single seat was purchased from the second bucket in the following week. If fewer seats are sold after a bucket has closed, the lower-fare buckets may be reopened again. Some of the available seats from higher-priced buckets would then move to the reopened lower bucket. Conversely, if the aircraft starts filling up too quickly, the airline may close low-fare buckets to get more revenue or even to keep some seats unoccupied, because there should be some seats available for business travelers who will pay a much higher price right before departure. This is all done in real time and automatically by IT systems that are working around the clock. Considering the number of tickets booked with an airline each day, it would be unfeasible and inefficient to perform these price changes manually.

Furthermore, prices are dynamically impacted by various external conditions. Suppose for example the cost of fuel increases, this would lead to higher fares. On top of that, airlines also consider seasonal trends. Summer vacation is usually the most demanded time of the year for some destinations, further impacting fare prices to that destination during that time. This is also true for events that occur at a specific destination, such as a concert or the Olympic games. Fare prices to that destination will be increased in anticipation of a higher demand for the relevant dates. Finally, the prices of competitors are also considered in the pricing of fares. If a competing airline opens a new flight for example, the competing flights will get cheaper.

As of Q1 2022, this is how dynamic pricing works in the airline industry. With the arrival of new technologies however, these pricing methods are aging fast (AltexSoft, 2019). The traditional understanding of one traveler being price-sensitive while the other is not, is very limited and airlines realize this. Currently, carriers mostly categorize their customers by demand and time of purchase. Through directly interacting with customers and leveraging big data, carriers could get a more detailed view of their customers. They could find out what other flights their customers are looking for, how often they check prices, which links they click on, and so much more. If airlines managed to tap into this data, they could leverage more advanced AI systems to fully personalize their prices. This is going to be future of dynamic pricing in the airline industry, which is supposed to happen soon. In fact, airlines have been embarking on a new data exchange standard called the new distribution capability (NDC) since 2012, which will allow airlines to receive more personal and detailed data about their customers.

But the resulting effects on consumers are yet to be properly understood. A study carried out in Germany has shown that airline passengers care about what other passengers pay for the same service (Krämer et al., 2018). Due to the highly personalized prices which will be possible in the near future, consumers will therefore most likely feel discriminated against by the fare prices. As fare prices are formed to maximize the airlines' profit and are not the same across all customers, the author deems dynamic pricing in the airline industry to be socially unfair; there exists a huge information asymmetry between the airline and the customer who does not have access to the large amounts of data the airline has over them. Fare prices can therefore be unpredictable and additionally with the large amounts of behavioral data the carriers have on their consumers, consumers may be tricked into paying the highest possible amount they would have been willing to pay. This price is most likely higher than the price they would have paid if prices were static and formed by more traditional means, without the help of advanced IT tools and capabilities. The consumers are essentially exploited by airlines through the use of IT to maximize their profits.

Haws and Bearden (2006) have studied the effects of dynamic pricing on the consumers' perceptions of fairness. They found that consumers perceive prices to be fairer when they play a role in the price-setting process, rather than when the prices are set by the seller. In the case of airline fares where the consumers act as price-takers rather than price-setters, this definitely contributes to the perception of price unfairness. However, this effect is diminished when the seller offers a good deal, as in a price that is perceived to be low by the consumer. A further interesting finding of the study is that consumers perceive frequent price changes within a short period of time to be more unfair than less regular price changes. As airline fares are constantly changing it comes to no surprise then, that

consumers more often than not perceive them to be unfair and that this perception of unfairness will increase in the future.

Roundup and Outlook

The author's conception of a just price is predominantly that of a socially fair price, which means that it abides by social norms. It makes sense then that there have been different ideas of a just price throughout history, as social norms greatly differ between historical eras. But even during the same time periods there may be vastly different ideas of a just price, which is due to the different circumstances present in different areas of the world. This makes it very difficult to define the just price beyond it being a price that is socially fair.

In today's IT-driven world, prices are distancing themselves from socially fair prices as firms leverage IT for the purpose of profit maximization. The internet, which at first was thought to make markets more transparent to the public, is actually expanding the information asymmetry between buyer and seller to the point where consumers feel exploited. In addition, the use of complex IT-tools makes price formation more untransparent to the consumer compared to the traditional cost-based pricing strategies used before the age of IT. This even allows firms to arbitrarily price their products without any justification of their pricing process. With the increasing ubiquity of IT and data available to firms, the author does not believe that this trend will change in the near future.

In order to achieve truly just prices, the author holds that the pricing strategy must be transparent to the customer. If the customer is aware of how the product or service she is purchasing or consuming is priced and is still ready to engage in a transaction, it means that she values it higher than its price. This will discourage unethical pricing strategies that are based on an information symmetry and appropriately account for the consumer's willingness to pay. These prices will then not only be socially fair, but also personally fair.

The age of IT is still in its very early stages, and it will be interesting to see how pricing strategies and consumer awareness will evolve in the coming years. The impact of IT on pricing strategies has not yet been extensively studied, as IT is developing at an accelerating rate. As of Q1 2022, research in the area of IT-enhanced pricing strategies and just pricing is sparse and the author encourages further research, as it affects everyone and is highly relevant.

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