The Power of Free

literature study to the zero price effect

Bachelor thesis

ERASMUS UNIVERSITY ROTTERDAM
Erasmus School of Economics
Department of Behavioral Economics
Julia Müller

C.W. Messelink
321454
321454cm@student.eur.nl

Table of content

1 Introduction

Zero has always had a special place in human history. It all begun in Babylonia around 450 B.C. when people started to realize they needed something to clarify bigger numbers. The oldest known text to a decimal positional system used, including zero, is a Jain text from India called Lokavibhaaga, from 458 AD. This text uses Sanskrit words as numeric digits, with the Sanskrit word for 'void' for zero. (Kaplan, 2000)

Talking about zero, is always talking in extremeness. It is zero or it is bigger than zero.

Zero can be a good thing. Like in medicines, when the doctor find zero traces of cancer or any other disease.

Zero can be a bad thing. Like is sports, when you have zero points the chances are big you are losing.

In school it depends on what word is behind zero. Zero point is not so good, zero faults is the best thing.

In prices, zero can be quite interesting. By giving away products for free producers hope they can affect the behaviour of the consumers. The question is if they can affect consumers behaviour.

There is a movie theatre in the Netherlands that awarded a year of free visits to the theatre to everyone who would place a tattoo of the logo of the theatre somewhere on their skin. (NOS, 2012) Six persons showed up and one of them declared that he only did it for the free movies. He seemed to forget that there is a permanent mark on his skin to remind him of these "free" movies.

It is clear that a zero price, or a free offer, attracts people. People sometimes drive miles to go to a free concert or to a free trip to the zoo. On 7th November 2011 the zoo Blijdorp in Rotterdam had an free entrance for a day. There was a visitor record that day, more than 46.500 visitors came to the zoo (AD, 2010).

How is it possible that free attracts so many people? Is there a so called power of free?

The first research done on the topic of the power of free or the zero price effect is done by Shampanier et all. (2007). Their results states that consumers have an overreaction to a product when it is for free. When consumers can choose between a product they like which is cheap, but not for free and a product they do not like that much, but is for free, they tend to choose for the product they like less, because it is for free.

Dan Ariely described all the experiments and the background in his book "Predictably Irrationality" (Ariely, Predictably irrational, 2009).

1.1 Purpose

The purpose of this thesis is to find if there is a zero price effect among the literature taken into account and to determine what can cause this zero price effect.

1.2 Structure

In the first section the theoretical framework is formed. In the second section there is going to be a look upon the results from different researches to determine whether or not there is a zero price effect. The third section will discuss these findings. In the next section the given explanations for the zero price effect will be reviewed and discussed. The fifth section conclusions will be drawn and limitations are described. At last some recommendations for future research will be provided.

2 Theoretical Framework

The research taken into account can be divided into two groups. One group did the same as Shampanier et all. (2007) and tested different combinations of two products, a non-free combination in which for both the high value and the low value product had to be paid and a free combination in which the low value product was for free.
The other group of researches was based on buying a product and get a second product for free. For example Nicolau and Sellers (2012) do an experimental approach if the zero price effect also occurs when the breakfast in the low value hotel is for free. The biggest difference between the first and the second group is that in the experiments of the second group nothing was entirely for free. Some part of the deal had be paid, in the example case the hotel.

To find whether or not there is a zero price effect it is important to determine what according to standard economic theory should happen with demand when the price of a product goes down to zero. So first there will be a summary about the standard cost benefit model before explaining the zero price model.

2.1 Standard Cost Benefit Model

The standard cost benefit model assumes that consumers are rational and make their decisions based on maximising their utility.

Rational consumers will act according to the following axioms[1]: (Nuemann & Morgenstern, 1944)

- Transitivity

  If you prefer product Q above product R, product R above product S, than you also should prefer product Q above product S

  Q > R en R > S than Q > S
- Completeness

  Product Q can be preferred over product R, or product R van be preferred over product Q or a person can be indifferent between the products.

  Q > R or R > Q or R ~ Q

[1] These are just the most important ones as part of the expected utility theory

- Revealed preferences

  The choice for a particular product out of two products, means that both products are affordable and available and so that the selected product is preferred over the non-selected product.

The standard cost benefit model states that consumers will buy a product if the value (V) of the product exceeds the price (P) of the product.

2.1.1 One component model

In a two product (product X and product Y) choice situation a consumer will buy a product if the value of the product exceeds the price of the product and if the value and price combined will exceed the value and price of the other product.
The value of the product will be assumed to be positive. (Shampanier, Mazar, & Ariely, 2007)

So, the consumer will buy product X if the value of the product will exceed its price.
$V_X > P_X$ and $V_X - P_X > V_Y - P_Y$ (Shampanier, Mazar, & Ariely, 2007)

And will buy product Y if the value of this product will exceed its price
$V_Y > P_Y$ and $V_Y - P_Y > V_X - P_X$

And finally, the consumer will buy nothing if the prices of the products exceeds their value.
$V_X < P_X$ and $V_Y < P_Y$

The standard cost benefit model states that a discount on the products does not affect the valuation of the products.

For product X this means that if $V_X > P_X$ and the discount α is positive, then $P_X > P_X - \alpha$, so $V_X > P_X > P_X - \alpha$ so that means that $V_X > P_X - \alpha$
The same explanation goes for product Y. If $V_Y > P_Y$ and the discount α is positive, then $P_Y > P_Y - \alpha$, so $V_Y > P_Y > P_Y - \alpha$ so that means that $V_Y > P_Y - \alpha$

The consumer will only buy product X if the value exceed its new price

$V_X > P_X - \alpha$ and $V_X - P_X - \alpha > V_Y - P_Y - \alpha$

The consumer will buy product Y if the value of the product exceed the new price

$V_Y > P_Y - \alpha$ and $V_Y - P_Y > V_X - P_X$

The buy nothing option will also change. The price of the products will go down after the discount, making it more likely than the consumer will buy any of the products.

The consumer will buy nothing if

$V_X < P_X - \alpha$ and $V_Y < P_Y - \alpha$

Due to the price reduction the demand for both the products will rise.

Some of the consumers who first bought nothing, will now buy the cheaper product or if the discount is high enough even the more expensive product, because the price might be lower than the value of the product, $V_X > P_X - \alpha$.

Consumers who first bought the cheaper product might now be able to buy the more expensive product, because the price might be lower than the value of the product, $V_Y > P_Y - \alpha$.

There will be less consumers who buy nothing.

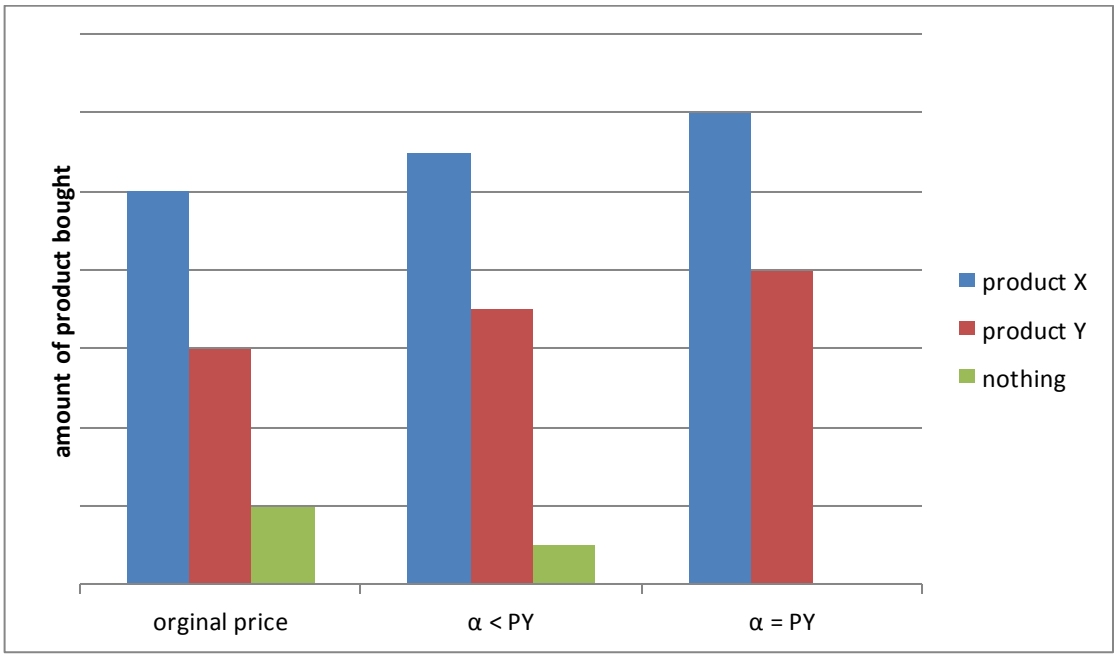

Figure 1: Schematic view of the quantity consumers buy at the original price and after discounts according to the standard cost model (Shampanier, Mazar, & Ariely, 2007)

Figure 1 shows in the left part the demand from consumers for both products X and Y when they have their original prices, P_X and P_Y.
The middle part shows the demand for both products when the discount α is smaller than the original price of product Y. The demand for both product will rise.
The right part of the figure show the demand for both products when the discount α is equal to the original price of product Y, P_Y, making product Y for free. The demand for both product will rise more. Still assuming that the value of the product is always positive, there will be no consumers buying nothing, because the value of product Y will be bigger than the price of the product, $V_Y > P_Y$

2.1.2 Two component model

In the two component model every product exist of two components. For example booking a hotel room with breakfast, or buying coffee with cake.

In a two component product the valuation of the product will depend on the value and the price of both components. This means that a product will be bought if the value of both components exceeds the price of both components. The consumer will buy the high value product if the value minus the price of both components will exceed the value minus the price of both components of the low value product.

Both components together form a product, so for example the hotel including breakfast at hotel M is the high value product, and the hotel including breakfast at hotel B is the low value product.

The consumer will buy product M which exist of two components R and B instead of product O which exist of the same two components if (Nicolau & Seller, 2012)
$V_{R,M} + V_{B,M} > P_{R,M} + P_{B,M}$
and; $(V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M}) > (V_{R,O} + V_{B,O}) - (P_{R,O} + P_{B,O})$

The consumer will buy product O which exist of two components R and B if
$V_{R,O} + V_{B,O} > P_{R,O} + P_{B,O}$
and; $(V_{R,O} + V_{B,O}) - (P_{R,O} + P_{B,O}) > (V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M})$

The consumer will buy nothing if the price of the both components exceeds the value of the components.

$V_{R,M} + V_{B,M} < P_{R,M} + P_{B,M}$

and; $V_{R,O} + V_{B,O} < P_{R,O} + P_{B,O}$

Adding a discount to the two component model is almost the same as in the one component model, except that this time the discount is just for one component, not for both.

Assuming again that the discount α is positive, and the value exceed the price, $(V_{R,M} + V_{B,M}) > (P_{R,M} + P_{B,M})$. This means after the discount $(P_{R,M} + P_{B,M}) > (P_{R,M} + P_{B,M} - \alpha)$ and so that $(V_{R,M} + V_{B,M}) > (P_{R,M} + P_{B,M} - \alpha)$.

If the price of component B from both products are reduced by the same amount (discount α), consumers will buy product M if

$(V_{R,M} + V_{B,M}) > (P_{R,M} + P_{B,M} - \alpha)$

And; $(V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M} - \alpha) > (V_{R,O} + V_{B,O}) - (P_{R,O} + P_{B,O} - \alpha)$

If the price of component B from both products are reduced by discount α, consumers will buy product O if

$(V_{R,O} + V_{B,O}) > (P_{R,O} + P_{B,O} - \alpha)$

And; $(V_{R,O} + V_{B,O}) - (P_{R,O} + P_{B,O} - \alpha) > (V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M} - \alpha)$

The consumers are less likely to but nothing, because the price of the products is lower.

Consumers will buy nothing, after the discount if the price exceeds the value.

$V_{R,M} + V_{B,M} < P_{R,M} + P_{B,M} - \alpha$

and; $V_{R,O} + V_{B,O} < P_{R,O} + P_{B,O} - \alpha$

2.1.3 Summary standard cost benefit model

Concluding for the standard cost model it is clear that the valuation of the product does not depend on the price of the product, but taken together the value and the price of the product let a consumer decide whether or not he is going to buy the product.

The formulas in the previous paragraphs make it easy to determine whether or not the consumer will buy a product and which one, or will buy nothing.
The only problem is that it is hard to see at the outside of the consumers how high he values a products. The choices he makes make it clear the he values one product above another, but not how high this particular value is.

According to this cost benefit model consumers will make a rational choice between the products. Making one of the products for free will not cause a switch from the high value product to the low value product.

2.2 Zero Price Model

The zero price model as stated by Shampanier et all (2007) and other research claims that a zero price is special.
Consumers will have an overreaction for any free object, since they will attach a special value to it. The intrinsic value will increase more, than the price will go down. This will affect the choice decisions that consumers make.

So the zero price model states that zero is not just a number as stated by the standard cost benefit model, but that a zero price is special.

To test for a zero price effect it is important to determine which of the choices in objects given to the consumers has the highest value to them.
The low value product will get a lower price than the high value product, otherwise no one would buy the low value product because price will exceed the value.

As both product have a price above zero, the consumers will choose the product they want according to the equations and statements made in previous chapter.

Like stated before this equation claims that nothing special will happen to the demands of the goods. There might be some small changes from consumers who first bought nothing to buying the low value product and a small switch from the low value product to the high value product.

2.2.1 One component model

The results on the other hand claim different. See figure 2. This figure is taken from research done by Shampanier et all (2007), but the results from the other research shows the same. The research done will be discussed in the next chapter.

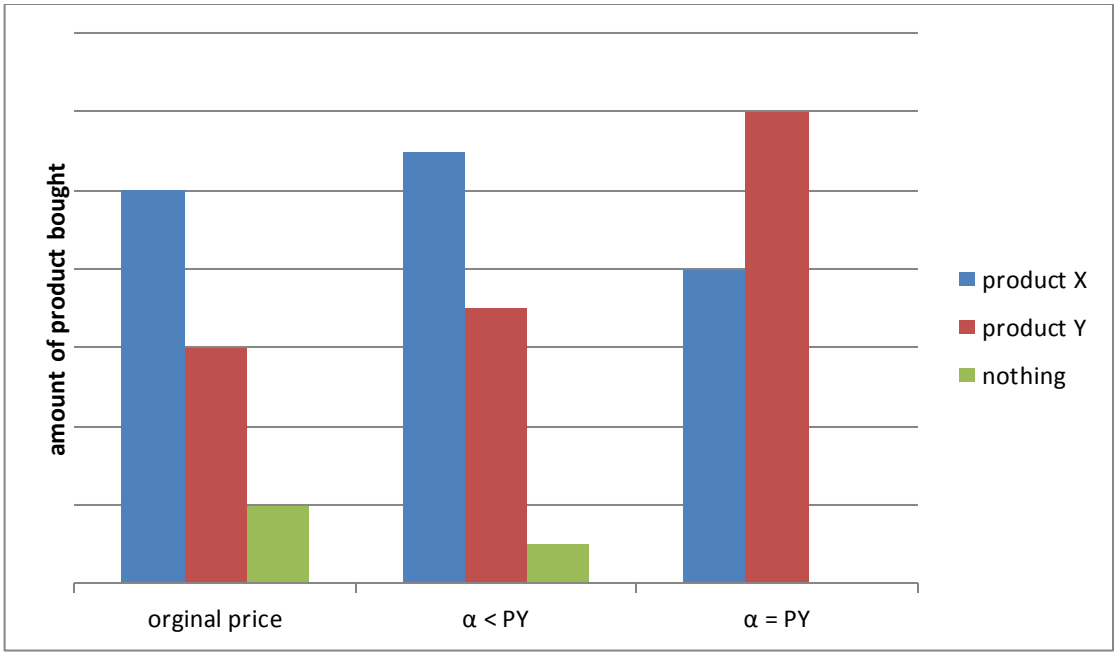

Figure 2: Schematic view of the quantity consumers buy at the original price and after discounts according to the zero price model. (Shampanier, Mazar, & Ariely, 2007)

Figure 2 shows in the left part the demand from consumers for both products X and Y when they have their original prices, P_X and P_Y.
The middle part shows the demand for both products when the discount α is smaller than the price of product Y, P_Y. The demand for both product will rise.
The right part of the figure show the demand for both products when the discount α is equal to the original price of product Y, P_Y, making product Y for free. The demand for product Y increases while the demand for product X decreases.

So these results indicate that there is a strong reaction to the free product Y.

This strong reaction toward the free product shows that consumers do not act according to the standard cost benefit model.
It seems like consumers attach a special extra value (β) to the free product Y.

For the one component model this means that (Shampanier, Mazar, & Ariely, 2007)
Assuming that the value consumers give to product Y is positive, so
$V_Y > 0$
And that there is an extra positive value β added to this value.
$V_Y + \beta > 0$

This makes that

$V_Y + \beta > V_Y$

So, adding this to the equation made in the previous chapter in combination with the results that shows that more consumers choose product Y when it is for free, so when it has a discount, over product X, it indicates that

$V_Y + \beta - (P_Y - \alpha) > V_X - P_X - \alpha$

Noting that the discount α given is equal to P_Y, making product Y for free.

$V_Y + \beta > V_X - P_X - P_Y$

For product X the assumption is made that the value consumers give to the product does not change.

This means that the valuation of product X is still the same way. The consumer will buy product X if

$V_X > P_X - \alpha$

and; $V_X - P_X - \alpha > V_Y + \beta - (P_Y - \alpha)$ or $V_X - P_X - P_Y > V_Y + \beta$

The consumer will buy nothing if the price of the product exceeds its value.

This is not the case when the low value product is for free, because the assumption was made that the value for a product is always positive, and in the case the price of the product is zero.

$V_Y > P_Y$, when P_Y is zero.

2.2.2 Two component model

The same thing goes for the two component products. (Nicolau & Seller, 2012)

The only difference is, that the product does not become for free, but that one component of the product is for free. Consumers still need to pay for the other half of the complete product.

Results indicate that consumers, although they still have to pay for the product, have a strong overreaction toward the low value product, when one of the components is for

free than when the component is not for free. This is the case when they have to choose between a high value product which has no free component and a low value product with a free component.

Assuming that the value consumers give to product O is positive, so
$V_{R,O} + V_{B,O} > 0$
And that there is an extra positive value β added to this value.
$V_{R,O} + V_{B,O} + \beta > 0$
This makes that
$V_{R,O} + V_{B,O} + \beta > V_{R,O} + V_{B,O}$

So, adding this to the equation made in the previous chapter in combination with the results that shows that more consumers choose product O when component B is for free, so when it has a discount, over product X, it indicates that
$(V_{R,O} + V_{B,O}) + \beta - (P_{R,O} + P_{B,O}) - \alpha > (V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M})$

Noting that the discount α given is equal to $P_{B,O}$, making component B of product O for free.
$(V_{R,O} + V_{B,O}) + \beta - P_{R,O} > (V_{R,M} + V_{B,M}) - (P_{R,M} + P_{B,M}) - P_{B,O}$

The buy nothing option is this two component model is different from that in the one component model.

For the low value product, there still needs to be paid for component R, so there still needs to be paid for the product.
It is still possible that the price of component R alone, exceeds the value of component R and the free component B together.
$(V_{R,O} + V_{B,O}) + \beta > P_{R,O}$

2.3 Definition zero price model

A single increase in the proportion of consumers buying product Y is not enough to prove for the zero price effect.

The definition of the zero price effect claims that in order to speak of a zero price effect two thing need to happen.

There need to be an increase in the proportion of consumers choosing product Y and there need to be a decrease in the proportion of consumers choosing product X, when the prices of the products go from $[P_Y,P_X]$ to $[0, P_X- P_Y]$ (Shampanier, Mazar, & Ariely, 2007).

3 Comparing the research and the results

The research taken into account can be divided into two groups.
One group tested different combinations of two products, a non-free combination in which for both the high value and the low value product had to be paid and a free combination in which the low value product was for free.
The other group of researches was based on the buy one product and get a second (different) product for free.

The researchers divide which product they should take as the high value product. This can be the usually more expensive or the fancier product. They add a higher price to the high value product and a lower price to the low value product. This way consumers can make a rational choice by comparing the values of the product to the price of the products.

This zero price effect was first described by Shampanier et all. (2007) and they were the first to write about this phenomena and most of the research done by others refer to their findings.

Explanations for this zero price effect will be discussed in a next chapter.

3.1 One component models

The zero price effect was always tested in the same way, except for Lew & Leong (2009) , who did not do any tests, but only draw conclusions from the events that were happening in Singapore.
Two products were chosen by the researchers. One low value product with a low price and one high value product with a higher price. Shampanier et all. (2007) used two different types of chocolates, just like Saraiva (2011) and Romell (2012).
Driuochi et all.(2011) used three different telecom providers as product and the prices of making a phone call or sending a text as the price for the product.

The first experiment is normally done in a cost condition, so that both products have a positive price. This is the reference point. This test can be done with different positive price combinations.

After the first experiment the price of both products decreased with the same amount. This may lead to another cost condition, with both products having a positive price, or already to the free condition, in which case the low value product is for free.
Important is that both product price are lowered with the same amount, so the price difference stays the same, and the difference in demand cannot be due to that.
The previous chapter explained what should happen to the demand for the products. For all products it should go up a bit, due to price decrease.

Shampanier et all. start off with a cost condition, the high value product costing 15 cents and the low value product costing 1 cent. After lowering the price with one cent, the free condition comes up. Demand for the high value product decreased and the demand for the low value product increases. See table 1.

The tables shows what happens when the prices of both product are lowered. The second row shows the price decrease for the product. The third row shows how the demand changes after lowering the prices of both products at the same times. The last row shows the probability of this demand change due to a t-test.

	Price change	Demand	Probability
High value product	15 to 14	Demand decrease	$P < 0.01$
Low value product	1 to 0	Demand increase	$P < 0.001$

Table 1:Results, first decrease in price Shampanier at all. (2007)

	Price change	Demand	Probability
High value product	14 to 10	Demand decrease	$P = 0.13$
Low value product	0 remaining 0	Demand decrease	$P = 0.64$

Table 2:Results, second decrease in price Shampanier at all. (2007)

Like stated before for the zero price effect to occur, there need to be an increase in the proportion of consumers choosing the low value product and there need to be a decrease in the proportion of consumers choosing the high value product, when the low value product becomes free.

After a while they lowered the high value product to 10 cents. This time both products suffered a decrease in demand, but both insignificant. See table 2.
The results are weird from any economic point of view, because it is considered a rule that when prices drop, the demand goes up. This results might have to do with the design of the study, see chapter 3.

Saraiva (2011) does approximately the same experiment as Shampanier et all. He let students pick between two different chocolates, while registering their response latency.
From the cost condition 15 for the high value product and 1 for the low value product to the free condition, gave a significant result for the low value product. See table 3.

	Price change	Demand	Probability
High value product	15 to 14	Demand decrease	unknown
Low value product	1 to 0	Demand increase	P = 0.034

Table 3: results Saraiva (2011)

The only problem with this results is that is shows that the demand for the low value product significantly increases, but not if the decrease for the high value product is significant. The real zero price effect consist of a combination of both.

Romell (2012) completes two experiments. The first one is with two newspapers. The first one being the low value product with interesting articles. The high value product claims to have more interesting articles. These options might be considered vague or even bad. The consumers can not choose between two real newspapers, but have to make a decision based on what the researcher says about how interesting the newspaper is. See chapter 3.1.
As can be seen in table 4 and 5, there is no significant zero price effect in this experiment.

	Price change	Demand	Probability
High value product	17 to 16	Demand decrease	unknown
Low value product	2 to 1	Demand increase	P = 0.476

Table 4: results newspaper experiment, first decrease in price Romell (2012)

	Price change	Demand	Probability
High value product	16 to 15	Demand decrease	unknown
Low value product	1 to 0	Demand increase	P = 0.1285

Table 5: results newspaper experiment, second decrease in price Romell (2012)

The second experiment is once again with chocolates. (Question remains why he did not do the first experiment again with for example actual newspapers.)
The results can be seen in table 6 and 7. Here the same problem rises as with Saravia (2012) because there are no significant results shown about the high value product. But still the participants valued the low value product higher after the price became zero.

	Price change	Demand	Probability
High value product	17 to 16	Demand decrease	unknown
Low value product	2 to 1	Demand increase	P < 0.149

Table 6: results chocolate experiment, first decrease in price Romell (2012)

	Price change	Demand	Probability
High value product	16 to 15	Demand decrease	unknown
Low value product	1 to 0	Demand increase	P = 0.0075

Table 7: results chocolate experiment, second decrease in price Romell (2012)

Lew & Leong (2009) have not done any experiment regarding the zero price effect. They draw conclusions from numbers about Singapore's road demand. Singapore introdcued road charges and decreased the price for public transport to have less cars in Singapore. Cars with a minimun of four passagiers were in the beginning exempted from the road charges. This lead to a grow in the popularitiy of car pooling, eventually leading people away from public transport. When Singapore stopped with this exception for road charges in lend to an end for carpooling. They conclude that "people are so attached to free that when roads are priced to anage congestuion, trael partterns undergo significants shifts to mitigate the feeling of loss". This feeling of loss can be attachted to loss averison, but too bad that do not expatiate to this.

Driouchi, Chetioui, & Baddou (2011) made their experiments a bit more difficult. They test different telecom providers and sepetate them for calls and for SMS. They do not present the results the same way the others did. They just draw the conclusion, at least it looks like that, from the percentage chage between the cost condition and the free condition.
They show a zero price effect for SMS, when they decrease the price of one of the telecomproviders to zero. They also found a zero price effect for calls, but this is less than the swift for SMS.

The biggest problem with this experiment is that there is not a real high value product and so a low value product in this experiment. There are just different telecom providers with different prices. It is nothing like chocolates. Chocolates differ in taste, telecom providers as presented in this research are exactly the same.

Table 8 is a summary of the research from this section. These results show that there exist a zero price effect in one component models.

Research	*Zero price effect?*
Shampanier, Mazar, & Ariely (2007)	Yes, in all experiments, except the forced analysis experiment (See chapter 4.4)
Driouchi, Chetioui, & Baddou (2011)	Yes, in all experiments, except the forced analysis experiment (See chapter 4.4)
Saraiva (2011)	Yes, in all experiments
Romell (2012)	Yes, but only in the second experiment
Lew & Leong (2009)	Yes, case study

Table 8: The one component model research taken into account and the result

3.2 Two component models

The zero price effect was tested in different ways for the two component models. Nicolau and Seller (2012) and Nicolau (2012) let the participant book a hotel room, and played with making the breakfast for free.
They wanted to test if a zero price effect would occur if the breakfast, so just one

component, was made for free. The other component, the hotel, still needed to be paid.

Nicolau and Seller (2012) actually did the same thing as the researchers in the one component model with chocolates. Except the chocolates were replaced with hotels. A high value hotel and a low value hotel. Price for the high value hotel € 24,- and for the low value hotel € 22,-. The difference was that this time not the price of the hotels decreased, but that breakfast was offered for different prices, at the high value for € 6,- and at the low value for € 4,-. Prices for breakfast were dropped with € 2,- until the free condition was reached.

Table 9 and 10 shows the results. Lowering the price with two euros in the first condition made that the standard cost benefit model did its job. Lowering the price till the free condition and the zero price effect took over.

There is a zero price effect for two component model in this experiment.

	Price for breakfast	Demand:	Probability
High value product	6 to 4	Demand increase	$P < 0.001$
Low value product	4 to 2	Demand decrease	$P < 0.027$

Table 9: results, first decrease in price Nicolau & Seller (2012)

	Price for breakfast	Demand:	Probability
High value product	4 to 2	Demand decrease	$P < 0.065$
Low value product	2 to 0	Demand increase	$P < 0.01$

Table 10: results, second decrease in price Nicolau & Seller (2012)

Nicolau has done some research on his own. He did a combinations experiment to test for the zero price effect and relative and referent thinking (Nicolau, 2012). The experiments done include once again a hotel with breakfast. This time the breakfast could be for free, or bookers would get a discount, with the same monetary value as the breakfast. To get the free breakfast of the discount participants were told they had to drive 15 minutes to a travel agent.

Participants preferred booking at a website instead of driving to the travel agent.

If the discount option is changed to a free breakfast option with the same monetary value as the discount, 65,96 % go to the travel agent's while with the discount only 26,92 % would go to the travel agent's. This is a significant difference ($P<0.001$).

Although this experiment is quite different than comparing two products with a different value and price, it still proves that there is a zero price effect.

Nasif & Minor (2011) namely focus on the violation of the transivity axiom due to the zero price effect. This will be discussed in the next section. They also find a kind of zero price effect, at least that consumers overvaluated the value of free gifts.

Spiegel et all. did something completely different. They did not offer two products to the consumers, but made up combinations of products with the same price. They offered them in different forms, like 'buy one, get one free' (BOGOF) or 'buy one, get a different one for free' (BOGDIF) against a 50% discount (Spiegel, Benzion, & Shavit, 2011).
It turns out that consumers in common prefer getting one product for free over getting a 50% discount. This also can be seen as a special case of the zero price effct. consumers overvaluated the free products, without really realising that it is actually the same as a 50% discount on both products. The zero price effect did not occur when the products offered where complement. Spiegel et all. offered that consumers see these two products as one, because they do not use the one without the other.

Results of this experiment are clear enough for the researchers to draw a conclusion about the zero price effect.
Looking at the data they provided, this is not real hard evidence. The two tailed paired t-test has a big range between the different products, varying from $P = 0.01$ till $P = 0.93$ for the BOGOF experiment. The BOGDIF results have a smaller range.
The results from the BOGOF experiment provide insufficient support to hold the zero price effect with the experiment done by Spiegel et all.

Table 11 is a summary of the research from this section. These results show that there exist a zero price effect in two component models.

Research	*Zero price effect?*
Nicolau & Seller (2012)	Yes, in all experiments,
Nicolau J. L. (2012)	Yes
Spiegel, Benzion, & Shavit (2011)	Yes, in the 'buy one, get the same product for free', and in the 'buy one, get a different product for free' only if the products were substitutes.
Nasif & Minor (2011)	Yes

Table 11: the two component model research taken into account and the result

3.3 Violation of transitivity axiom

In the results of Shampanier et all (2007). after their first experiment in the cost condition 14% of the student choice the low value product, 36% choice the high value product and 50% did not purchase anything. In the free condition (prices were 14 and 0 cents cents) 42% of the students choice the low value product and 19% the high value product and 39% did not purchase anything. See figure 3.

So assuming that 11 per cent of the consumers who bought nothing in the first case changed their mind and "bought" the free product. This means that still 17% of the consumers who first bought the high value product switched to the low value product.

In the other free conditions (prices 10 and 0) even 24 per cent of the consumers changed their mind.

If a consumer preferred the high value in the cost condition they act according to $V_X - P_X > V_Y - P_Y$

Making the low value product for free means they should act the same since $V_X - P_X - P_Y > V_Y$

In fact the consumer should "like" the product even more, because of the lower price.

But the opposite is happing, as explained and showed before, and consumers switch from the high value product to the low value product.

This is a violation of the axiom of transitivity.

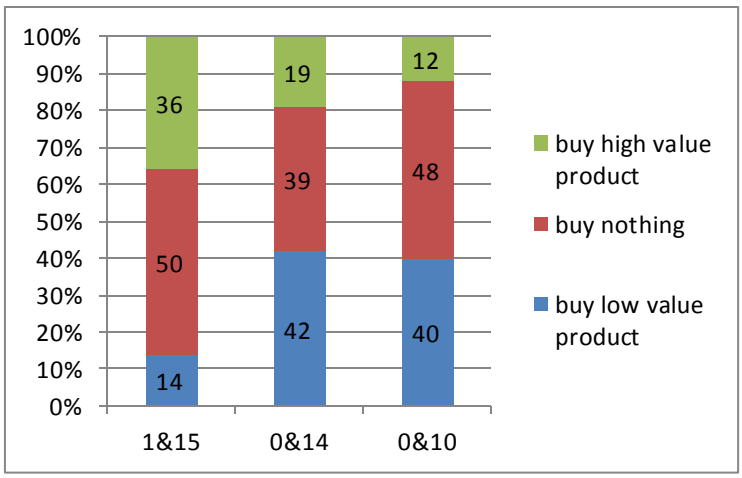

Figure 3: Figure 3 from experiment 2 from Shampanier et all. (2007)

In research done by Nasif and Minor the violation of the transitivity axiom is also showed (Nasif & Minor, 2011). They conclude that consumers do stuff, in this case fill out an applications form for a credit card or opening a new checking account, in return for a free gift. This free gift had a lower value than the value consumers in average wanted to fill out the application form or opening a new checking account. So consumers make up their mind about how much value they want in order to do something for another, but actually do this for free stuff with a lower value.
This also is a violation of the transitivity axiom.

4 Critics

The results show that there is a zero price effect in almost every research.
However, there are some things that might affect this zero price affect due to the kind of experiment, the participants used or the design of the studies.

4.1 Experiments vs. surveys

Most of the research is done due to surveys or questionnaire.
This might be an easy way of doing research but it can affect the results.
Shampanier et all. (2007) states it themselves that their first experiment is just "a hypothetical situation, which means that it remains an open question whether consumers will behave in the same way when faced with real transactions."

For example, see the thesis done by Romell (2012). He sets up an survey in which consumers have to choose between an interesting newspaper and a more interesting newspaper, as the low and high value product. These options are vague and that makes it hard to make a rational decision about the value the newspapers have for the consumer. In this particular choice situation the zero price effect disappears.
This would not have been the case if the participants had to make an actual choice in an experiment between two existing newspapers.

Furthermore experiments, with real purchases will have an effect on the results in that way that consumers would really feel the pain in the wallet when they choose for the non-free option.
Consumers would act different when they purchase with their own money, having to handle the money or write a check.
This own money should not been handled to them for the sake of the experiment, because this also can affect the results, since consumers do not see that as their own and would use is indifferent. (Helen R. Neill, 1994) (Cummings, Harrison, & Rutström, 1995)

4.2 Buy nothing

The buy nothing option is quite interesting. Especially in the free condition the results of Shampanier et all (2007) show a lot of students, they call participants, buy nothing.

Question is if they really are participants. Driouchi et all (2011). were the only other researches taking the buy nothing option into account.
To have a good view at the zero price effect it is important to also include the buy nothing option, because it is possible that the consumers who would otherwise take nothing just make up their mind based on something random. For a good research this option should be included, because the buy nothing option is always there in real life with real purchases.
On the other hand it is dangerous to count people as participants who buy nothing in a real purchase experiment, who just walk by. They might have not noticed the experiment or were way too busy to take any interest in it. Claiming that these people are participants in the experiment, who bought nothing, can seriously affect the outcome of the results.

4.3 Products

I understand that real experiments with chocolates are easy to do. One of the problems with using chocolates in experiments however might be the low value of a chocolate. Off coarse someone could be starving for a chocolate or really needs some for his mother birthday and give it a really high value, but I won't assume that for now. Shampanier et all. also thought of this. They conducted a survey and let consumers choose between two televisions instead of two chocolates. The price of the high value 32" television was $ 599.- higher than the low-value 17" television. At a certain point the low value television was for free, while its highest price was $ 299,-. The high value television was at it cheapest point, so in the free condition $ 599,- and the highest price was $ 898,-.

In the free condition the zero price effect occurred. This does not come as a surprise. A television with the normal price of $ 299,- for free, who can refuse that offer? Especially when the other television is priced at $ 599,-. I wonder if the zero price effect would have been so strong if the price difference between the two products would not have been $ 599,-, but for example $ 99,- or $ 49,-. This is a really good offer for a 32" television. Would the zero price effect still hold strong under these price conditions?

If the television is too much to experiment with, the price of the high value chocolate can also be lowered to 1 cents. If the difference in price between the high value product and the low value product becomes smaller the zero price effect might be reduced.

4.4 Participants

Shampanier et all, Driouchi et all (2007), Spiegel at all (2011), and Saraiva (2011) all used students as participants for their research. Without being biased, students in common are not richest persons in the world. It could be possible that their financial status pushes them to choose the free option.
Furthermore, students are all from a certain age and are on average higher educated than the average individual. It is possible that experiments done with elderly people or people from other social classes or other educational level would react different to a zero price.

Research on the subject of using student as test persons is inconclusive (Peterson, 2001). Some tend to say that students do not represent the average consumers (Wells, 1993), while other claims that the use of students as test subject as appropriate (Ok, Shanklin, & Back, 2008)

4.5 Free-free condition

To determine the complete zero price effect research should have been done with both products for free. It might be that consumers switch back to the standard cost model when both products are for free, or social norms might take over.
Social norms research indicated when products are offered for free, consumers still take the product, but usually not more than one.
The problem with making both products for free is that there nothing left of the original price difference. So if the high value product is for free, it means that the low value product should have a negative price.
This is not a price anymore and it is not very realistic that consumers would get products and money for free.
According to standard cost benefit model the high value product, product X would be bought when $V_X > P_X$, so in the case when $P_X = 0$, $V_X > 0$.

The low value product would be bought if, product $V_Y - P_Y > 0$, but in this case the price will be negative so, $V_Y > -P_Y$

The value of both products will always exceed the price in this case.

The question remains if there will be an overreaction to the zero price for the high value product or for getting extra money for the low value product.

5 Explanations to the zero price effect

Researches came up with a lot of different explanations for the zero price effect. They will be described in the next sections.

5.1 Transaction costs

The first explanation coming in mind is that it is way more easy to take the free product. There are no additional cost in taking a free product. Especially in the experiments with free chocolate there is nothing more easy then walking by the table and taking one of the free chocolates and walk away again. It is way more easy than making up your mind it the value of the chocolate exceed the price, taking your wallet and pay for it.

Most researches thought about it. Shampanier et all. redesigned their chocolate experiment to a local cafeteria. The chocolates were located at the counter. So only consumers who were already planning to buy something could see the chocolates. So there was no transaction cost in getting your wallet. The results still show a significant zero price effect.

Nicolau conducted an experiment for booking a hotel room with a possible free breakfast (Nicolau J. L., 2012). The hotel room with the free breakfast could only be booked at a travel agent's, 15 minutes away. So there were higher transaction costs for the free option. Still the free option was more favourable for the participants, even though they had to go to the travel's agent.

This all leads to the conclusion that transaction costs are not strong related to the zero price effect.

5.2 Social norms

One of the other explanations Shampanier et all. gives for the zero price effect is social norms.

They say that costly options invoke market exchange norms, whereas free products invoke norms of social exchange. Thus evoked social norms may create higher value for the product.

So because prices are not mentioned the social norms take over, adding an extra value to the product.

The thing with the experiments done so far is that the subjects had to make a choice between an object with a monetary value and one without, at least for them. By mentioning money for one object directly related to the object without any money mentioned consumers will use the norms used in a monetary exchange. It is not likely that anyone will apply social norms to the free product part and monetary norms to the non-free product, when he is faced with both products at the same time.
To make an test for social norms, Shampanier et all priced the low value chocolate negative. The price was set at minus 1 cents. This way the product was still free, but a monetary value was mentioned. If the zero price effect is due to social norms demand is this condition should be the same as in the cost condition. This was not the case. The results with the negative cost condition were equal to the free condition.
None of the other researches took a deeper look at social norms as a possible explanations. Some research mentioned it, but did not do any experiments with it. The ones who mentioned it cited Shampanier et all. concluding that social norms is not an explanation.

Social norms are not an explanation for the zero price effect.

5.3 Mapping difficulty

The mapping difficulty states that consumers find it difficult to map the utility they expect to receive from hedonic consumption into monetary terms. (Ariely, Loewenste, & Prelec, 2003)

Shampanier et all. claims that the mapping difficulty would vanish if money isn't involved anymore in the experiment.
They made up an experiment with trading chocolate for chocolate instead of buying the chocolate, this way staying away from any monetary value.
Children and later adults were given three small candies, each around 0.16 oz.
In the free condition they could get one small Snickers candy bar, weighing around 1 oz. or trading one of their candies for a big Snickers candy bar. It would make sense to trade one of their own to the bigger Snickers candy bar, because they would gain 2 – 0.16 oz. extra chocolate, and in the free condition they would only gain 1 extra oz. worth of chocolate. But here the power of free strikes again.

Which is particular weird, because in the non-free condition, which meant trading one of their own candy to the small Snickers candy bar of two of their own for the bigger Snickers candy bar almost everyone chose to trade two of their own for the bigger Snickers candy bar.

Also in cases were the object offered were of monetary value, consumers seem to have a weak spot for free things. For example take gift certificates. (Shampanier, Mazar, & Ariely, 2007) (Ariely, Predictably irrational, 2009) They have a certain value in money and you pay for them in money. Calculation in money should be more easy for most consumers they calculating and thinking of the weight of chocolates and candy bars. But once again the power of free is way more attractive than being rational.

When faced with buying gift certificates for $ 5,- with a value of $ 10,- or buying a gift certificate with a value of $ 20,- for $ 12,- most consumers chose to buy the gift certificate of $ 12,-, making a $ 3,- 'profit' in comparison with buying the gift certificate with a value of $ 10,-. But if both prices drop with $ 5,-, making the $ 10,- certificate for free consumers stop calculating and take the free certificate instead of making the $ 3,- profit and buying the $20,- gift certificate.

These experiments show that making no reference to money or any monetary value what so ever, does not affect the zero price effect.

Mapping difficulty is not one of the explanations for the zero price effect.

5.4 Affect

The affect account had two basic components (Finucane, Alhakami, Slovic, & Johnson, 2000). The first is that free offer evoke higher positive affect and the second is that consumers use this affect as an input for their decision-making process.

So to test for affect two hypotheses need to be confirmed.

Hypothesis 1: There a high affective reaction.

hypothesis 2: The consumer uses this high affective reaction as a input for their decision making process.

Consumers seem to have a high affective reaction to the free product compared to not free products. This was tested by Shampanier et all (2007) and Driouchi et all (2011) with a survey on which student were offered one of the two products, for two different prices. Product Y for 1 cents or for free, product X for 13 cents of 14 cents.
Participants were also asked to indicate their feelings, attitude toward the offer that was made. The attitude towards the free product was significant higher than toward any of the other three offer with a $P < 0.001$.
This is a confirmation of hypothesis 1 regarding affect.

For hypotheses 2 there was a different experiment done. Using a forced analysis the researches let the participants first think about how high they value the products.
By letting the participants first think about how they feel about the offer, instead of just offering the products, the researches hoped that the zero price effect would vanish.
The zero price effect however did not vanish completely. Direction and effect remains the same, but this movement is not significant. See table 9. Table 8 is from the same survey, but without the forced analysis, as comparison.

14 & 1 to 13 & 0	High value product	Demand decreased	$P < 0.001$
	Low value product	Demand increased	$P < 0.001$

Table 8: Results Shampanier et all. (2007) experiment without forced analysis

14 & 1 to 13 & 0	High value product	Demand decreased	$P = 0.6$
	Low value product	Demand increased	$P = 0.5$

Table 9: Results Shampanier et all. (2007) experiment with forced analysis

Good thing to notice is that in the forced analysis part, 2 per cent of the participants in the cost condition decided not to buy anything. None of the participants in het cost condition without the forced analysis choose the buy nothing option. By having to think about it, participants might have found out that they actually do not value chocolate high enough to buy it.

Driouchi et all (2011) did the same experiment as Shampanier et all. They also find after an survey that zero prices create a positive affective reaction with the

participants, so confirmation of hypotheses 1. When they tested if the zero price if this high affective reaction is used as an input for their decision making process, the results are really different than those of Shampanier et all. There are no significant relations between the liking or disliking of the goods and the actual choosing of a good or between the not liking to pay and the free product. This rejects hypotheses 2.

5.4.1 Zero risk bias

According to Saraiva (2011) affect is also not a real explanation for the zero price effect. The results of Shampanier et all. just show that there is a relation between affect and the zero price effect, but not what might cause the affect towards free products in the first place.

He gives two possible explanations for this affect. Zero risk bias and mental transaction costs.

The zero risk bias claim that consumers prefer a small certain benefit to the larger benefits which are not certain. A free product involves a small certain win, while the non-free product might have a value lower than the price. This counts especially in cases when you are exposed to the products for the first time.

This was tested by doing letting the participants choose chocolates once again, two times. Once in the free condition and once in the cost condition. For half of the participants first came the cost condition and second the free, and for the other half it was the other way around. Results suggest that the order of the experiment and the propensity of switching between the products do not have a significant relationship. The zero risk bias is not cause for affect.

5.4.2 Mental transaction costs

This was tested by Saraiva (2011) with the response latency.

He claims that choosing a product with a zero price zero should be a more easier choice and so there must be a lower response latency. The participants do not have to think about the value of the free product, because the value will always exceed the price, which might not be the case with the high value product.

The results do not support this suggestion. The response latency fluctuates with how many times the experiment is done. Because the test was only done two times, once in

a cost condition and once in a free condition, participants were slower the first time and faster the second time, because they knew how the experiment worked and which products were offered.

Mental transaction costs are unlikely to be the cause of affect.

5.5 Loss aversion

Romell (2012) moves from the given explanations from Shampanier at all (2007), and tries to find out if loss aversion is a cause for the zero price effect. He conducted two experiments, one failed to have a zero price effect, and determined after that if participants with a high loss aversion were more likely to choose the free product in the free condition. He did the same experiment with chocolates as Shampanier et all. but added a questionnaire about loss aversion. He compared this questionnaire to the decisions the person made in the experiment.
The results confirm that the participants with a high loss aversion were more likely to choose the free product.

Although I am also likely to think that consumers with a high state of loss aversion are more likely to choose the free product I do not agree upon the way Romell tested it, see previous chapter.

Because there is no more other research done on the topic of loss aversion in combination with the zero price effect, it would be possible that this is a cause of the zero price effect, but also suggest more research on this topic.

5.6 Explanations

Affect seems to be an explanation for the zero price effect. Shampanier et all (2007) found this as a result.
Driouchi et all (2011) found an explanation in affect for the zero price effect with SMS, not with calls. Like stated in the critics part of this thesis, this might have to do with the products used by the researchers.
More research need to be done, to determine the cause of the zero price effect.

Loss aversion is not much investigated in combination with the zero price effect. The only paper found was one of a bachelor student who showed that that the zero price effect is the strongest amongst those with a higher level of loss aversion. It is not clear if the loss aversion causes the zero price or that a zero price makes consumers more loss avers.

6 Conclusion

An overview of the literature shows that there is an indication toward the zero price effect. The results indicate that when the price of the low value product is lowered to zero, the demand for that product rises more, than would be expected on the hand of the standard cost benefit model.

It is hard to say that there is a zero price effect, because the zero price effect as presented by Shampaniet at all. (2007) claims that there need to be an increase in demand for the free product, and a decrease in demand for the non-free product. Results show that there on overall is an increase in the demand for the free product, but that is not always combined with a decrease in the demand for the non-free product.

6.1 Nudge

Thaler and Sunstein will be pleased with some results of the zero price effect. They came up with the term libertarian paternalism which refers to policies designed to help consumers who behave irrationally and so are not advancing their own interest (Thaler & Sunstein, 2008). Thaler and Sunstein claim that by redesigning the choice situation, consumers can be pushed in direction which is (rationally) better for them. The zero price effect makes that consumers start making other choices than they did before. This effect can be used to let consumers make a better choice. For example, making the public transport, which is not the preferred way to travel for most people in the Netherlands, for free can make it more attractive for people than assumed by standard cost benefit model.

6.2 Limitations

One major limitation for a good answer to the questions if there is a zero price effect lays in the experiments done. All experiments, surveys and questionnaires done were either about chocolate or about booking a hotel with a potential free breakfast. So my research does not make any statements about more expensive or more complex products.

6.3 Future research

The power of free is a new topic. Mainly all research is done with chocolates and booking hotels. Future research can focus on more expensive products. I would suggest especially in the two model component, with making the first component expensive and then determine if a free extra component could also cause a zero price effect.

I would also suggest more research on how people from different ages, social classes and educational level would react to a zero price. This might help marketers to make special offers to such a group of persons.

Other research also can be done on products with more than two components. For example, for a holiday a lot of travellers book their hotel, breakfast, flight and transport from the airport at one website, as one product. Would there be a zero price effect with such a multiple component model?

Further it would be interesting to see if loss aversion indeed is a cause for the zero price effect. This could be done in an experiment with lotteries (Kahneman & Tversky, 1979). With free and non-free lotteries with established probabilities loss aversion can be showed together with the zero price effect. Lotteries are a good way to indicate loss aversion. (Schimdi & Horst, 2005) Participants who take a lottery with a high chance of winning a small price in comparison with a lottery that has a low chance of winning a big price, are usually considered loss avers.

To test for a zero price effect can be done, by changing the price of the lottery tickets. The hardest way is to find out about the high and low value product in this case, but this can be done with the prices in the lottery, for example brand products, against non-brand products.

Bibliography

AD. (2010, November 7). *Bezoekersrecord voor gratis Blijdorp*. Retrieved from ad.nl: http://m.ad.nl/ad/nl/5596/Planet/article/detail/1903618/2010/11/07/Bezoekersrecord-voor-gratis-Blijdorp.dhtml

Ariely, D. (2009). *Predictably irrational.* New York: Harper.

Ariely, D. (2010, november 11). *The power of free tattoos*. Retrieved from danariely.com: http://danariely.com/2010/11/10/the-power-of-free-tattoos/

Ariely, D., Loewenste, G., & Prelec, D. (2003). Coherent arbitrariness: stable demand curves without stable preferences. *Quarterly Journal of Economics*, 73-105.

Cummings, R., Harrison, G., & Rutström, E. (1995). Homegrown Values and Hypothetical Surveys: Is the Dichotomous Choice Approach Incentive-Compatible? *The American Economic Review*, 260-266.

Driouchi, A., Chetioui, Y., & Baddou, M. (2011). How Zero price Affects Demand? Experimental Evidende from the Maroccan Telecommunication Market.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*(13), 1-17.

Helen R. Neill, R. G. (1994). Hypothetical Surveys and Real Economic Commitments. *Land Economics*(70), 145-154.

Kahneman, D., & Tversky, A. (1979). Prospect Theory - Analysis of Decisions under Risk. *Econometrica*(47), 263-291.

Kaplan, R. (2000). *The nothing that is; a natural history of zero*. Oxford: Oxford University Press.

Lew, Y., & Leong, W. (2009). Managing Congestion in Singapore - A Behavioural Economics Perspective. *Journeys*.

Nasif, N., & Minor, M. S. (2011). "Free" Gifts and Irrational Preferences: An Exploration for Effect of Promotional Enticements on Finacial Decision Making. *Advances in Cosumer Research*, 292-299.

Nicolau, J. L. (2012). Battle Royal: Zero-price effect vs relative vs referent thinking. *Springer Science*, 661-669.

Nicolau, J. L., & Seller, R. (2012). The Free Breakfast Effect: An Experimental Approach to the Zero Price Model. *Journal of Travel Research*, 243-249.

NOS. (2012, January 20). *permament bioscoopkaartje op je lijf*. Retrieved from nos.nl: http://nos.nl/op3/artikel/332598-permanent-bioscoopkaartje-op-je-lijf.html

Nuemann, J., & Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. Princeton: Princeton University Pres.

Ok, C., Shanklin, C. W., & Back, K. (2008). Generalizing Survey Results from Student Samples: Implications from Service Recovery Research. *Journal of Quality Assurance in Hospitality & Tourism*(8), 1-23.

Palmeira, M. M. (2011). The Zero-Comparison Effect. *journal of consumer research*, 16-26.

Peterson, R. A. (2001). Science Research: Insights from a Second-Order Meta-analysis. *Journal of Consumer Research*, 450-461.

Romell, D. (2012). Is Loss Aversion Causing "FREE!" to Flourish? *bachelor thesis*.

Saraiva, F. (2011). Free Products and Their Impact on Consumer Behavior.

Schimdi, U., & Horst, Z. (2005). What is Loss Aversion? *The Journal of Risk and Uncertainty*, 157–167.

Shampanier, K., Mazar, N., & Ariely, D. (2007). Zero as a special price: The true value of free products. *Marketing Science*, 742-757.

Spiegel, U., Benzion, U., & Shavit, T. (2011). Free Product as a Complement or Substitute for a Purchsed Product - Does it Matter? *Modern Economy*(2), 124-131.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale: Yale University Press.

Wells, W. D. (1993). Discovery-oriented consumer research. *Journal of Consumer Research*(19), 489-504.