ASSESSING GOVERNMENT INTERVENTION TO REDUCE NEGATIVE EXTERNALITIES OF CAR USE IN MOSCOW

Economics Extended Essay

How effective has state-owned Moscow Metro's pricing strategy been in reducing the negative externalities of car use in the city?

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Introduction

Moscow[1], the capital of Russia and its largest city, home to 12.3 million people (Rosstat, 2016), is known for its traffic. So much so that, in 2013, the city's road capacity could only withstand 700,000 individual cars (Belyanin et al, 2013), while there were as many as 4m vehicles registered (ibid., 2013).

Responding to the problem, the city administration has implemented a range of market-based policies and changed the regulation. Overall, the policy could be summarised as follows: to internalise the externality in the car market, **discouraging the use of cars** and **encouraging the use of public transport.**

Central to the latter part of the approach is the Moscow Metro, which is the most commonly used type of public transport with 2.48bn journeys a year (Moscow Metro, 2016, p.3). Given that Metro is in the public sector, Moscow city government can set its prices and invest in its infrastructure, just like a private firm, but in the interest of the public.

The congestion problem is deeply rooted in the history of Moscow's urban development, though it will be impossible to address the causes of Moscow's road traffic congestion within the scope of this essay. Responding to the question of '**How effective has Metro's pricing strategy been in reducing the negative externalities of car consumption in Moscow?**', I analysed the policy outcomes as of 2017, and attempted to determine the contribution of **one** aspect of the policy – Metro's pricing strategy – to the final outcome.

[1] Title page images come from (Reuters/Karpukhin, 2009) and (Into-Russia, 2017).

Why I chose this topic?

Born in Moscow and having lived there for the majority of my life, I got to experience the city's traffic congestion first-hand, while being dropped off at school by my parents and then coming back by bus. Back then, there were barely any attempts to improve the situation. However, the city government gradually became more involved in the market since 2013, with the official election of Sergei Sobyanin as the new Mayor.

Recently, I've stumbled upon a popular blog urging people to abandon their cars in favour of public transport (Varlamov, 2017). Intuitively, the motif seemed to be recurring, with many car users following this blogger's suit. However, I could not trust my feelings without any facts, and hence chose to analyse the topic, applying my own economics knowledge to a market that affects the lives of virtually every Moscow resident.

Research Method

In assessing the extent to which the pricing strategy has been successful, I first outlined the theoretic basis behind government approaches to 'internalise' the externality in the car market, and the effect of Metro pricing on the customers and the supplier itself.

I read some Russian academic papers that dealt with potential measures to reduce traffic in Moscow, and, hence, external cost to the society. Crucially, there was little to no literature written specifically about Moscow traffic by international scholars, which I suspect is due to the difficulty of accessing data for those outside the city. I believe the origin of the papers does not significantly limit their findings, as academics are unlikely to be politically biased on the issue, where there are no competing theories.

I then gathered some secondary data on the change in the external costs, comparing it to Metro price change over time. To put the data in its macroeconomic context, I also calculated the price of Metro in real terms, using official inflation figures. This allowed me to determine if there is any correlation between the two variables.

Further, I surveyed the Metro users to try to investigate their consumer preferences and estimate the price elasticity of demand. This allowed me to determine how significant price incentive was in encouraging car users to switch to Metro.

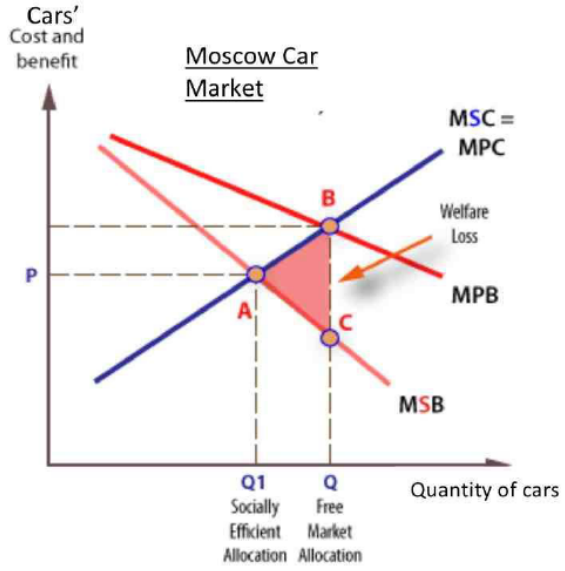
In the interest of the investigation, I restricted the timeframe, only using secondary data from 2013 to 2017 (where there was data available). The dates were not chosen at random: in 2013, a new pricing regime was implemented, central to which was Troika – a new

contactless card with the same function as that of Oyster in London. This eased the process of buying a ticket and hence made the core product more attractive to consumers, contributing to a growing use of Metro (and, arguably, a falling use of cars).

Theoretical Hypothesis

Negative externalities of cars

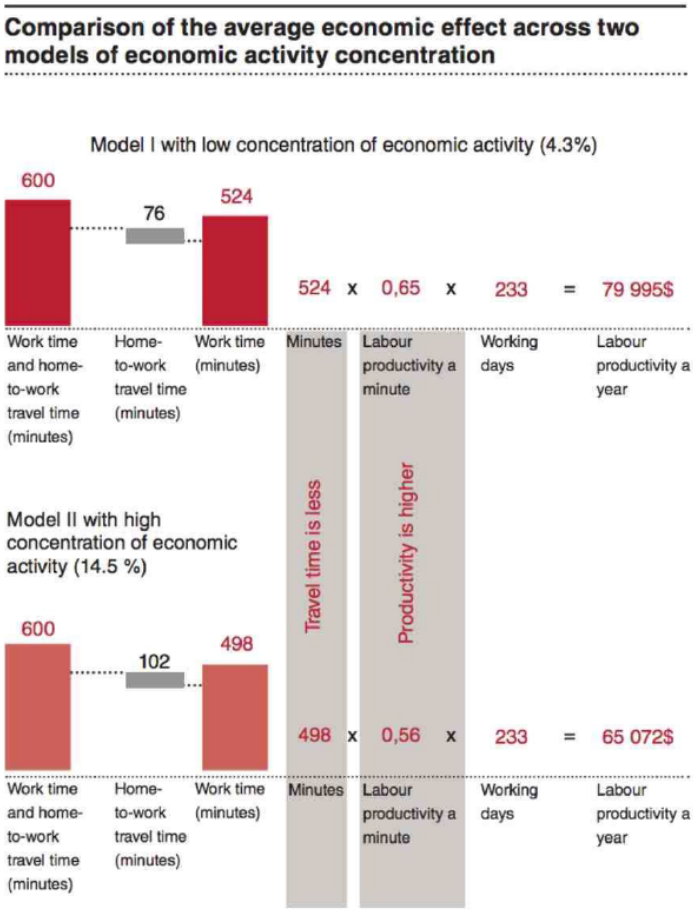
In Moscow's market for private transport, there is **market failure**, as free market forces lead to a socially inefficient resource allocation (Anderton, 2008, p. 104). As shown on Figure 1, car overuse results in negative externalities of consumption, as social costs (MSC) outweigh social benefits (MSB) when cars are 'consumed' at Q. Hence, the free market price of car use is lower than is socially optimal (Q_1), at MSC=MSB. There is a welfare loss, represented by the red triangle:



(Figure 1. Adapted from Economics Online, 2017)

While it might be rational for each and every person to buy a car because of its convenience, too many cars in Moscow are detrimental to the society, causing traffic congestion. So much so that, Tomtom's annual ranking (Tomtom, 2013) named Moscow "the most congested city in the world" in 2012. Road congestion leads to longer journey times and a loss of productivity, among other things. MADI, a leading urban planning university estimated that, in 2009, the total external cost of traffic was 40bn roubles a year (Regnum, 2010), at the time the equivalent of $1.26bn (Audit-it.ru, 2017), as employees got to work later (due to the morning peak-hour) and in a significantly worse mood. This lead to inefficiencies in the economy and might have detrimented economic growth, limiting the productive potential of the city.

PricewaterhouseCoopers (PwC, 2017) shows that the this might be due to a high concentration of economic activity in the city centre (Model II), all the while cities like New York and London have a low concentration of economic activity (Model I). The report shows that Moscow's productivity is thus around **19% lower** than that of a Model I city, illustrated by the Figure 2 below.



(Figure 2. PwC, 2017)

In addition, spending one's time stuck in traffic has a negative psychological impact, decreasing the quality of life for driver. Hence, the driver's family and friends would suffer from this as well. It is difficult to estimate the economic impact of a welfare factor, but it is clear that psychological issues are nonetheless a significant cost to the society.

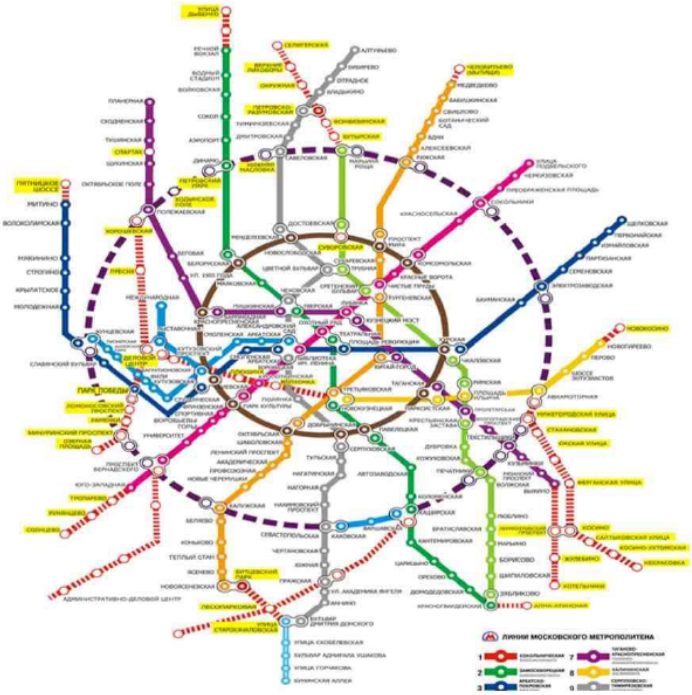
Further, carbon monoxide (CO) and other harmful gases are given out by cars, hurting the environment. However, rather than being a major contributor to global warming, Moscow

itself sufers most from the problem - in the form of bad ecology and, occasionally, smog. Therefore economists estimated the cost to the environment to be around 14.9 billion roubles (Khovavko, 2011), which translates to around $500m according to historical currency exchange ratios (Audit-it.ru, 2017).

Substituting cars

To tackle the problem, the city administration encouraged car users to switch to public transport – buses, trams, trolleybuses and underground as a solution.

The latter of those stands out as the one that is most frequently used: in 2016, there were 2.48 billion journeys made (Moscow Metro, 2016). It is clear that Metro plays a key role in the city's plan to tackle external costs of cars, with 146 km of new lines built between 2012 and 2020 (Metrostroy, 2012a), shown by the diagram below:



(Figure 3. Metrostroy, 2012b) Dotted lines denote new lines and yellow highlight denotes new stations

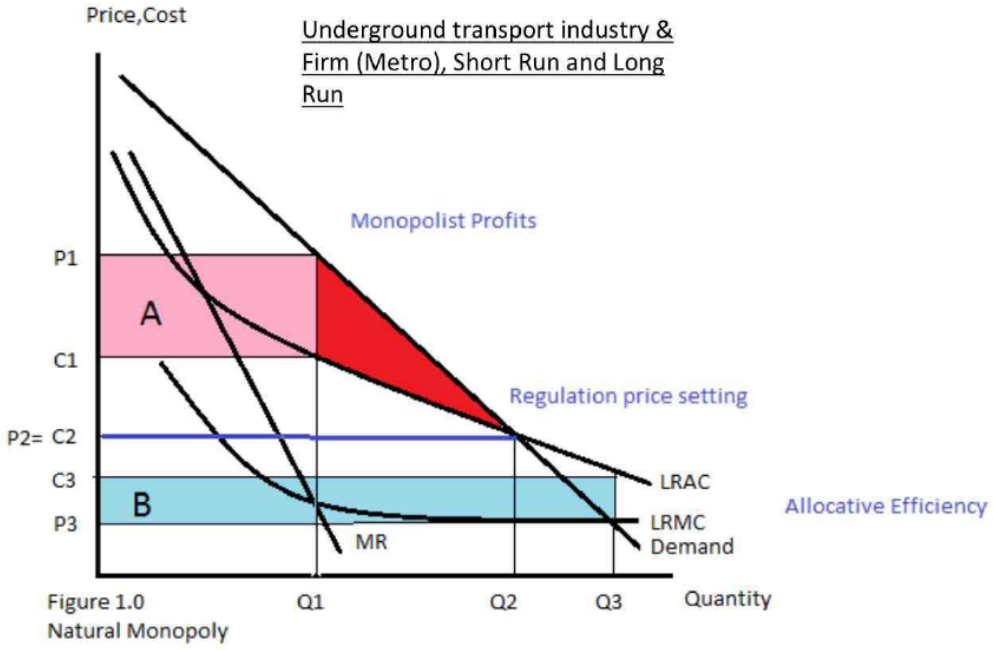
As Metro and cars are substitutes, a fall in the price of Metro will mean a fall in demand for cars, hence reducing the total car use and the external costs associated with it

The effectiveness of the policy depends on the **price elasticity of demand** for Metro – the responsiveness of demand to a change in price (Anderton, 2008). If the demand is price elastic, then many more will start using Metro if the price is lowered, which might at least partly solve the market failure by decreasing car use towards its socially optimal level. However, a price inelastic demand would mean that much fewer commuters will switch to Metro if price is decreased, hindering the effectiveness of the policy.

Pricing in a natural monopoly

The city government directly controls the price of Metro and the availability of services, being the sole owner of Moscow Metropolitan, a natural monopolist in the market for underground rail services.

A profit-maximising monopolist would set the price where Marginal Revenue = Marginal Cost, shown below, earning supernormal profit (box A) while imposing a welfare loss on the society, represented by the red triangle.



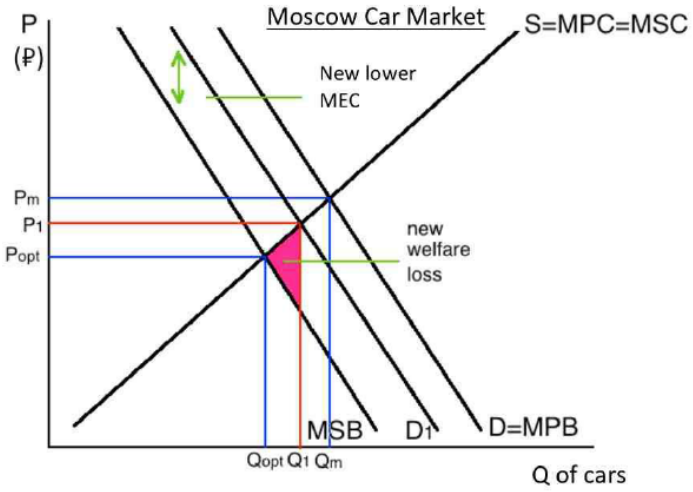
(Figure 4. Adapted from Kellyandjenny, 2012)

However, the goal of Moscow administration is to maximise the consumption of Metro (at Q3), minimising car use, rather than maximising profit. Unlike a profit-oriented monopolist, Metro sets the price for its services at P_3 where Price = Marginal Cost, i.e. pricing at marginal cost, which is allocatively efficient, making a loss (box B). Evidently, this is seen on the recent Metro income statement, points 1.2 (operating profit) and 1.4 (net profit), an excerpt is provided in Appendix 1.

Making a loss[2] due to such pricing might be justified if the society is set to benefit – if, as the demand for Metro increases, the demand for cars decreases and the external cost of cars is decreased. This should shift the demand curve for cars leftwards (D=MPB to D_1 on

[2] Loss in accounting terms is equated to economic loss.

Figure 5 below), reducing the welfare loss and the size of the externality as cars are now consumed at Q_1.



(Figure 5. Adapted from IB Revision, 2012)

Other policy responses

Moscow has also introduced a fee for parking slots on the streets in 2013. First, the policy was restricted to inner city only, but has since expanded to include more areas. Similarly, the a possibility of a congestion charge was discussed, but was never implemented.

The main aim of those policy responses was to 'internalise' the consumption externality by raising the cost of owning a car, thereby shifting the MPC curve upwards by the vertical amount of a parking fee. Effectively, this is an indirect tax on car users, who are made to pay the cost they impose on the society. In doing so, the city administration would hope to

effectively put the burden of a negative externality on a car user, further discouraging car consumption.

Hypothesis

Since 2013, the price of Metro has fallen in real terms, rising far slower than inflation. In theory, a falling price should signal to consumers and attract them to the Metro market, hence exiting the car market. Given that both Metro and cars perform the same function (i.e. moving people around the city), I would reckon that they are close substitutes. This would mean that, following a decrease in the real price of Metro since 2013, there would have been a greater percentage decrease in the quantity of cars demanded, ideally getting closer to a socially optimal level. Hence, the negative externality should have been reduced, and the pricing of Metro would have played a key role in that reduction.

Economic Analysis

Measuring price

The core service that Metro customers are buying every day is *a journey* on its underground rail system. Unlike other major cities, the cost of a journey does not depend on the distance travelled. However, the pricing strategy of Metro has evolved and become more complicated – it is possible to purchase a ticket for 20, 40 and 60 journeys, a monthly and an annual pass as well as other plans. Throughout this essay, I will refer to 'price' as the **cost of a single journey made on Troika smart card**, introduced in 2013 and now used by as many as 61% of Metro customers (Moscow Metro, 2016, p. 10).

Comparing the price of Metro and the inflation, a sustained rise in general price level (Anderton, 2008), a clear trend emerges. In the recent years since 2013, the rouble has depreciated, i.e. fallen in value (expressed in dollar terms). Hence, imports (mainly consumer goods) have become more expensive, and inflation was high throughout the period.

Despite that, Metro have committed to only **marginally** increasing the fare. While the cost of living has risen for an average consumer, the proportion of their budget spent on Metro has fallen. Hence, to put the price into its wider macroeconomic context, I calculated the Metro price **in real terms**, with 2013 (start of investigation) as a base year:

	Metro price per jouney (31/12 of the year), roubles	Inflation rate	Deflator	Metro price in 2013 roubles (Real price)
2013	28.0	6.5%	100.0	28.0
2014	28.0	11.4%	106.5	26.3
2015	30.0	12.9%	118.6	25.3
2016	32.0	5.4%	133.9	23.9

(Figure 6. Inflation data from Statbureau.org, price data from Wikipedia, 2017[3])

To calculate the deflator for each subsequent year, I used the formula below:

$$Deflator\ (Yn) = Deflator(Yn-1) * (1 + \%\ Inflation\ in\ Yn-1)$$

The real price of Metro(in 2013 roubles) was calculated using the formula:

$$Metro\ price\ in\ 2013\ roubles = \frac{Nominal\ price}{Deflator}$$

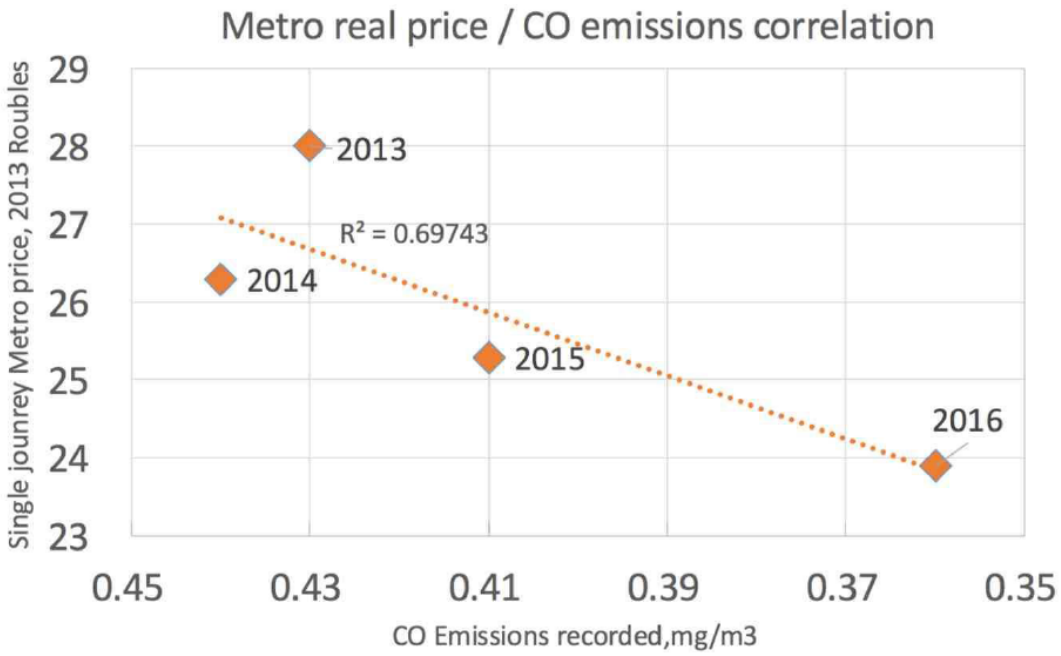
Between 2013 and the end of 2016, the price of Metro fell by around 15% in real terms (in 2013 roubles) precisely due to the management's commitment to producing at P=MC, making a loss but achieving allocative efficiency, whilst maximising the use of Metro and reducing the negative externality associated with car use.

[3] The limitations of Wikipedia as a source have been considered. However, there was no other source (in English nor in Russian) that would have all the price data for 2013-2017.

Price / External Costs

If the hypothesis was correct, then a decrease in the real price of Metro must have at least **correlated** with a decrease in factors such as congestion and emissions of harmful gases.

To analyse this, I took the pollution data from Moscow Department for Environmental Management and Protection (Department for Environment, 2014-17), and plotted it on a graph against the real Metro price. While the department collects data for multiple harmful gases, I restricted the data to carbon monoxide (CO) only, as it is the most lethal of all. The graph below shows the data (the table of data can be found in Appendix 2)



(Figure 7. Data from Appendix 2)

The data shows that, as the real (adjusted for inflation) price of Metro has fallen, so have the CO emissions, a significant contributor to the external cost of cars. It would be likely that lower CO emissions show that the number of car miles has decreased.

Further, Moscow has now fallen to 13th place in Tomtom's ranking (2016), losing its spot as the most congested city in the world. This suggests that the external cost has indeed decreased since 2013.

However, **correlation does not mean causation** – there could've been other factors that contributed to the fall in CO emissions – like factory closures and improved efficiency of cars. While we can see that the pollution has been reduced, we cannot conclude that Metro prices are the sole reason for this.

Price elasticity of demand

The aim of the pricing strategy was to encourage more citizens to use Metro, which should have discouraged them from using cars. The effectiveness of this strategy thus depended on price elasticity of demand (PED) for Metro – whether a decrease in price lead to a greater percentage increase in quantity.

Therefore, I have surveyed Metro users to try to determine the PED for Metro. To make the data more representative, I have gathered responses of random 150 commuters across 3 different stations – Strogino (Line 3), Belorusskaya (Line 5) and Paveletskaya (Line 2). The full survey is shown in Appendix 3, with an exemplar result in Appendix 4.

For the first part of the survey (questions 1-3), I estimated the willingness of car users to switch should the price on Metro rise. Initially, I included 3 possible price hikes – 10%, 20% and 30%. However, after testing the survey on an initial sample of Metro users, I found the variation in results to be very slim, suggesting the demand will be rather inelastic. Hence, to gain a better understanding of the consumer's attitudes, I have changed the scenarios to 10, 50 and 100 per cent hikes. In each event, the participants were offered 5 choices and asked to quantitatively estimate the likelihood of a switch using percentages (100%, 75%, 50%, 25% and 0%), linked directly to the qualitative responses (highly likely, rather likely, somewhat likely, rather unlikely, unlikely).

I then proceeded to group the results and, for each of the possible price increases, to estimate the number of Metro customers in the event of a price increase, with a hunch that it will be the top 2 bands that are going to switch:

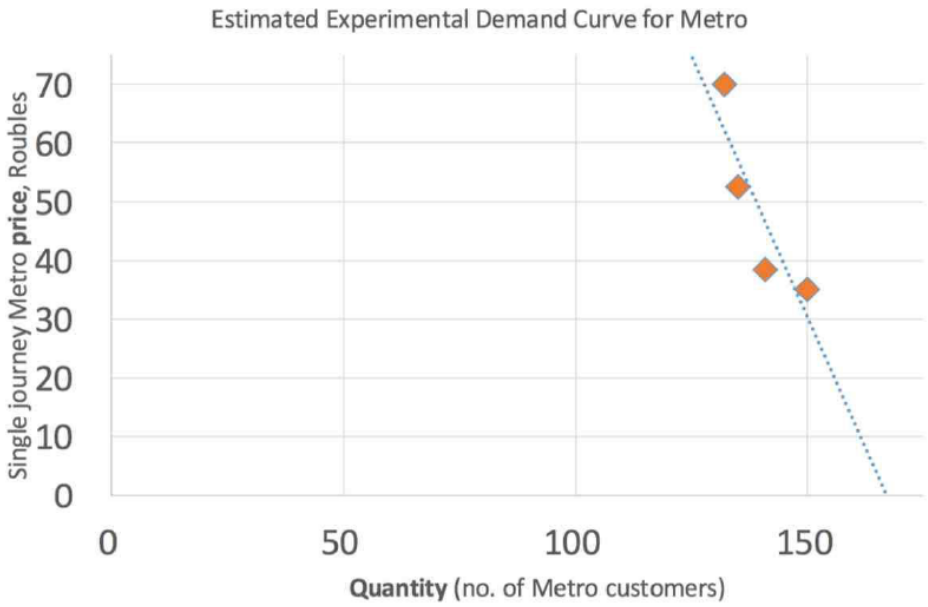
$$\begin{aligned} &Number\ of\ potential\ Metro\ users\ in\ the\ event\ of\ a\ price\ hike \\ &\quad = 150\ (Initial\ Number\ of\ Users) \\ &\quad - (Users\ "Highly\ Likely" + Users\ "Rather\ Likely"\ to\ switch) \end{aligned}$$

The results of the estimation are shown in the table below:

Price (roubles)	Number of potential Metro users
35 (current)	150
38.5 (10% higher)	141
52.5 (50% higher)	135
70 (100% higher)	132

(Figure 8. Data based on the survey design (Appendix 3) and the calculation above)

Based on the data, I have plotted the experimental demand curve to represent the attitudes of the customers.



(Figure 9. Based on Figure 8)

The PED value varies between the data points as demand curve has elastic and inelastic sections. However, taking it between the upper and the lower bound of data gives:

$$PED\ (Metro) = \frac{\%\ change\ in\ Quantity}{\%\ change\ in\ Price}$$

$$PED\ (Metro) = \frac{(132 - 150)/150}{(70 - 35)/35} = \frac{-0.12}{1} = -0.12$$

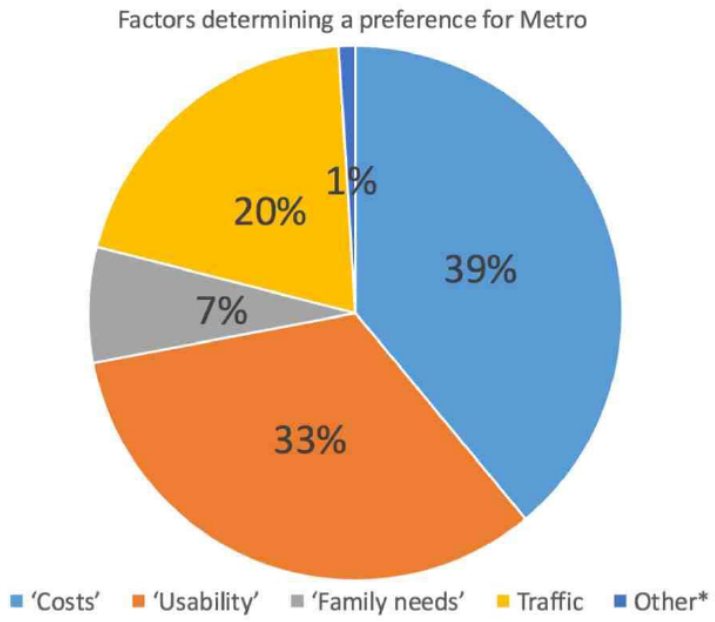
A PED value of -0.12 for Metro signifies that demand for Metro is **extremely price inelastic**. For the city government, this leads to two conclusions.

Firstly, Metro users are (generally) unwilling to switch even in the face of the price increase. Hence, the monopolist will see their revenue rise if it chooses to increase the price (in real or even nominal terms), while a decrease in quantity will not be as significant. Yet it could be argued that, since the goal of Metro is to **maximise** the number of customers, any number of customers moving away from Metro is not desirable.

Secondly, **price alone does not act as a strong enough incentive for car users to switch to Metro**. They are aware that the cost of buying and, then, maintaining a car are much greater than the unlimited annual pass for all public transport types (Edinyi ticket, 18200 RUR). Still, many users clearly seem reluctant to switch.

Non-price determinants of demand for Metro

Hence, it must have been other determinants of demand for Metro that have a greater contribution to the success of the policy. With the last survey question, participants had to choose **the most important** factor in their choice of transport. While the highest proportion of Metro users surveyed (39%) concluded that price was the most important factor in their choice of transport, 33% of Metro customers concluded that 'удобство использования' (roughly translated as 'usability') was the most important factor.



(Figure 10. Appendix 2, question 6)

The data suggests that, in order to encourage a switch from cars, Metro should further invest in the quality of the service provided – new lines, more comfortable trains and greater

integration of different transport types could see consumer preferences shifting further away from cars.

While price incentive is generally insignificant for a lot of car-owning consumer groups, they are swayed more by further investments in usability and the capital investments in infrastructure, expanding to cover more and more districts of the city, following the developments already underway as per Figure 3.

Conclusion

Responding to the question '**How effective has Metro's pricing strategy been in reducing the negative externalities of car consumption in Moscow?**' I conclude that, since 2013, the external cost of car use *has been reduced*, as evident in lower CO emissions and and a fall in congestion.

However, correlation between a rise in social welfare and the government policy does not mean that the latter had caused the former. Clearly, a fall in the real price of Metro does coincide with a fall in the external cost. At the same time, there were significant capital investments undertaken by the Metro, meaning that the 'price' variable cannot be isolated with other variables controlled for; a problem all too common in Human Sciences.

Further, the possible inelasticity of demand for Metro means that **just** lowering the price would have limited effect on car users. While this **does not** render the pricing strategy ineffective, it means it might have only contributed to a fall in external costs as there were capital investments and policies to raise the cost of owning a car. Hence, my hypothesis is only partially validated.

Looking forward, I think Metro should focus on improving the quality of its service rather than on capping its price to attract even more automobile users, by building new lines and making journeys more comfortable.

Evaluation

Arising from the investigation are a number of **unresolved questions**. First, I have only considered a single price (on Troika card), omitting the price discrimination aspect of Metro's strategy. Not only is the price different for different consumer groups (such as students and pensioners), Metro also has lower prices for Troika-based tickets. I could investigate whether doing so encourages a more widespread use of the smart card, itself making the product more 'usable' and hence maximising the quantity consumed.

Further, as I was doing the investigation I realised that I will be unable to analyse all the data and construct a mathematical model, not having the skills in statistics required to do so.
I would also like to look at the ways other cities have dealt with the traffic problem, and if their experience could be applied to that of Moscow, comparing the measures taken by the Moscow government to those of their counterparts.

Research method limitations

First, the knowledge claims derived from the survey were of limited certainty. A sample of 150 users cannot possibly reflect the reality if millions of people are using Metro. Not all of the participants have been car users, and the questions were too brief to understand their individual circumstances.

The central theme throughout this essay was *estimation* – of negative externalities, of price elasticity of demand and of consumer attitudes. Doing so was a significant challenge for

me, as some information (harmful gases other than CO, for example) had to be discounted to maintain the focus of the investigation. I am still puzzled by the fact that academics such as Khovavko (2011) were able to estimate the effect of environmental factors on the society in monetary terms, but I suspect they found it a challenge too.

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Appendices

Appendix 1: Moscow Metro 2016 Income Statement

Основные показатели деятельности организаций, относящихся к субъектам естественных монополий,
ГУП "Московский метрополитен"

№ п/п	Наименование показателей	Единица измерения	Фактические показатели за 2015г.	Показатели, утвержденные на 2016г.	Предложения на расчетный период регулирования 2017г.
1.	Показатели эффективности деятельности организации				
1.1.	Выручка [Total Revenue]	тыс. рублей	54 667,81	95 212,83	189 055,34
1.2.	Прибыль (убыток) от продаж [Operating profit (loss)]	тыс. рублей	-47 119,53	-19 917,88	-
1.3.	EBITDA (прибыль до процентов, налогов и амортизации)	тыс. рублей	-7 626,32	27 431,61	61 109,10
1.4.	Чистая прибыль (убыток) [Net profit]	тыс. рублей	-47 119,53	-19 917,88	-
2.	Показатели рентабельности организации				
2.1.	Рентабельность продаж (величина прибыли от продаж в каждом рубле выручки). Нормальное значение для данной отрасли от 9 процентов и более	процент	-	-	-
3.	Показатели регулируемых видов деятельности организации				
3.1.	Расчетный объем услуг в части управления технологическими режимами [2]	МВт			

(Source: adapted from Mosmetro.org, 2017)

Appendix 2: CO Emissions and Metro real price table of data

	CO emissions in Moscow, mg/m3	Real Metro price (2013 roubles)
2013	0.43	28.0
2014	0.44	26.3
2015	0.41	25.3
2016	0.36	23.9

(Sources: Department for Environmental Management and Protection, (2014-17), Wikipedia.org (2017))

Appendix 3: Survey questions and results

NB The current price per journey in Metro is 35 RUR via Troika (transport card)
Annual pass for all modes of transport is 18,200 RUR

1. Если цена на проезд увеличится на 10% (до 38.5 рублей за поездку, а годовой абонемент до 20,020 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 10% (up to 38.5 roubles per journey or annual pass up to 20,020 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - 25% – Скорее нет, чем да - [Rather unlikely]
   - 0% – Ни в коем случае - [Unlikely

	No. of customers	Percentage of customers
100%	3	2%
75%	6	4%
50%	6	4%
25%	30	20%
0%	105	70%

2. Если цена на проезд увеличится на 50% (до 52.5 рублей за поездку, а годовой абонемент до 27,300 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 50% (up to 52.5 roubles per journey or annual pass up to 27,300 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - 25% – Скорее нет, чем да - [Rather unlikely]
   - 0% – Ни в коем случае - [Unlikely]

	No. of customers	Percentage of customers
100%	6	4%
75%	9	6%
50%	15	10%
25%	24	16%
0%	96	64%

3. Если цена на проезд увеличится на 100% (до 70 рублей за поездку, а годовой абонемент до 36,400 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 100% (up to 70 roubles per journey or annual pass up to 36,400 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - 25% – Скорее нет, чем да - [Rather unlikely]
   - 0% – Ни в коем случае - [Unlikely]

NB The current price per journey in Metro is 35 RUR via Troika (transport card)
Annual pass for all modes of transport is 18,200 RUR

	No. of customers	Percentage of customers
100%	13	9%
75%	5	3%
50%	17	11%
25%	20	13%
0%	95	63%

4. Каким видом транспорта вы будете пользоваться, если не метро?
   [If not Metro, what other forms of transport would you use?]

	No. of customers	Percentage of customers
Personal car	15	10%
Bus/tram	83	55%
Car-sharing	26	17%
Taxi	9	6%
Bike	14	9%
Other*	3	2%

*responses include 'on foot' (once) and 'kick scooter' (twice)

5. Насколько важна цена для вас при выборе метро как транспортного средства?
   [To what extent do you regard price as a factor that influences whether you use Metro?]
   - 100% – Очень важна - [Very much]
   - 75% – Важна - [Rather much]
   - 50% – Весьма важна [Somewhat]
   - 25% – Скорее не важна - [Not very much]
   - 0% – Не важна- [Not at all]

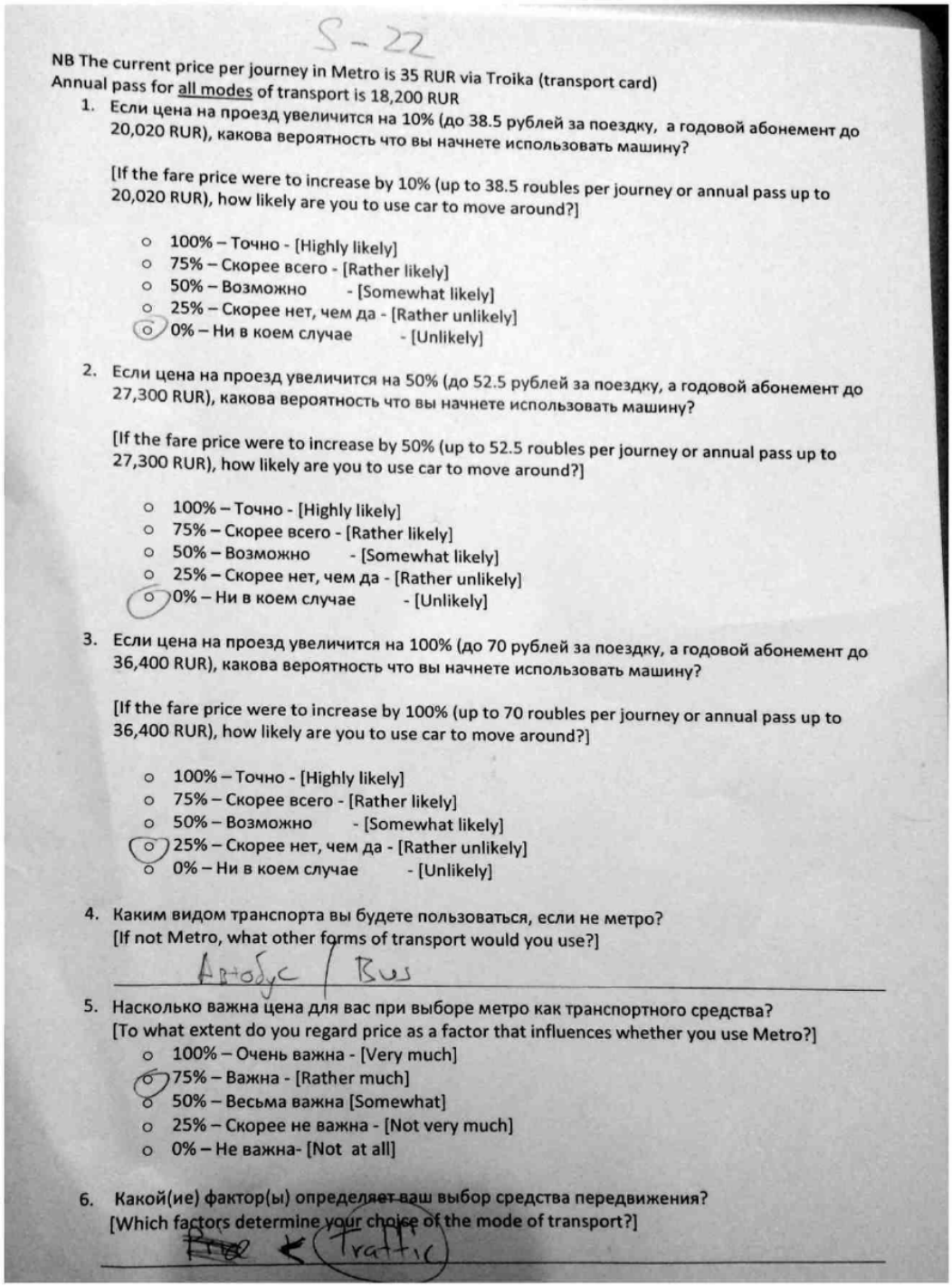
	No. of customers	Percentage of customers
100%	82	55%
75%	5	3%
50%	3	2%
25%	3	2%
0%	57	38%

6. Какой(ие) фактор(ы) определяет ваш выбор средства передвижения?
   [Which factors determine your choice of the mode of transport?]

	No. of customers	Percentage of customers
'Costs'	59	39%
'Usability'	49	33%
'Family needs'	10	7%
Traffic	30	20%
Other*	2	1%

* responses include 'free WiFi on Metro' and 'habit'

Appendix 4: Exemplar survey



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NB The current price per journey in Metro is 35 RUR via Troika (transport card)
Annual pass for all modes of transport is 18,200 RUR

1. Если цена на проезд увеличится на 10% (до 38.5 рублей за поездку, а годовой абонемент до 20,020 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 10% (up to 38.5 roubles per journey or annual pass up to 20,020 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - 25% – Скорее нет, чем да - [Rather unlikely]
   - (0%) – Ни в коем случае - [Unlikely]

2. Если цена на проезд увеличится на 50% (до 52.5 рублей за поездку, а годовой абонемент до 27,300 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 50% (up to 52.5 roubles per journey or annual pass up to 27,300 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - 25% – Скорее нет, чем да - [Rather unlikely]
   - (0%) – Ни в коем случае - [Unlikely]

3. Если цена на проезд увеличится на 100% (до 70 рублей за поездку, а годовой абонемент до 36,400 RUR), какова вероятность что вы начнете использовать машину?

   [If the fare price were to increase by 100% (up to 70 roubles per journey or annual pass up to 36,400 RUR), how likely are you to use car to move around?]

   - 100% – Точно - [Highly likely]
   - 75% – Скорее всего - [Rather likely]
   - 50% – Возможно - [Somewhat likely]
   - (25%) – Скорее нет, чем да - [Rather unlikely]
   - 0% – Ни в коем случае - [Unlikely]

4. Каким видом транспорта вы будете пользоваться, если не метро?
   [If not Metro, what other forms of transport would you use?]

   Автобус / Bus

5. Насколько важна цена для вас при выборе метро как транспортного средства?
   [To what extent do you regard price as a factor that influences whether you use Metro?]
   - 100% – Очень важна - [Very much]
   - (75%) – Важна - [Rather much]
   - 50% – Весьма важна [Somewhat]
   - 25% – Скорее не важна - [Not very much]
   - 0% – Не важна- [Not at all]

6. Какой(ие) фактор(ы) определяет ваш выбор средства передвижения?
   [Which factors determine your choice of the mode of transport?]

   Time & (Traffic)