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**Helicopter Money and the Propensity to
Consume Transfers: The Case of Czech
Republic**

Bachelor's thesis

Author: Jakub Doležal

Study program: Ekonomické teorie

Supervisor: prof. PhDr. Tomáš Havránek PhD.

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Declaration of Authorship

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Prague, August 2, 2022

Jakub Doležal

Abstract

The thesis discusses the topic of helicopter money — unconventional monetary policy aimed at increasing sub-target inflation and reviving GDP growth when the orthodox monetary policy is constrained by the zero lower bound (ZLB) on policy rates. From the perspective of the households, helicopter money transfer is a windfall gain. Part of the transfer — marginal propensity to consume (MPC) — is within weeks turned into consumption. MPC directly affects the outcomes of the policy, it is therefore advisable to predict it. The first part of the thesis describes unconventional monetary with special emphasis on helicopter money, quantitative easing and debt monetization. The second part is then devoted to identifying country-level drivers of MPC and subsequently predicting average MPC across Czech households using meta-analytic approach. While controlling for publication bias and performing variables selection through Least Absolute Shrinkage and Selection Operator (lasso) the model predicts average marginal propensity to consume the transfer ranging from 0.46 to 0.51 during the years of sub-target inflation and under ZLB on policy rates within the Czech economy.

JEL Classification	E21, E31 E52, E58
Keywords	helicopter money, monetary policy, marginal propensity to consume, zero lower bound, lasso regularization
Title	Helicopter Money and the Propensity to Consume Transfers: The Case of Czech Republic
Author's e-mail	50735965@fsv.cuni.cz
Supervisor's e-mail	tomas.havranek@ies-prague.org

Abstrakt

Bakalářská práce pojednává o helikoptérových penězích — typu nekonvenční měnové politiky, jenž cílí na zvýšení inflace a oživení růstu HDP v časech, kdy je klasická měnová politika omezena nulovou spodní mezí na úrokových sazbách. Z pohledu domácností jsou helikoptérové peníze mimořádným příjmem. Část tohoto příjmu — mezní sklon ke spotřebě — domácnost v řádu týdnů promítá do spotřeby. Z hlediska přímého vlivu mezního skolu ke spotřebě na efektivitu

helikoptérových peněz je záhodno mezní sklon predikovat. První část práce popisuje nekonvenční měnovou politiku s důrazem na helikoptérové peníze, kvantitativní uvolňování a monetizaci státního dluhu. Druhá část textu je pak vyhrazena identifikaci proměnných ovlivňujících mezní sklon ke spotřebě na úrovních států. Následuje vlastní odhad průměrného mezního sklonu ke spotřebě v České republice za použití meta-analytického přístupu. Při očištění o publikační zkreslení a za použití lasso algoritmu pro výběr proměnných v lineární regresi, docházíme k výsledku že mezní sklon ke spotřebě transferu v dobách inflace pod inflačním cílem a nulových úrokových sazeb dosahoval hodnot mezi 0,46 a 0,51.

Klasifikace JEL	E21, E31 E52, E58
Klíčová slova	helikoptérové peníze, měnová politika, sklon ke spotřebě, nulová spodní mez, lasso regularizace
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E-mail autora	50735965@fsv.cuni.cz
E-mail vedoucího práce	tomas.havranek@ies-prague.org

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Contents

List of Tables	viii
List of Figures	ix
Acronyms	x
1 Introduction	1
2 Unconventional Monetary Policy	3
2.1 Quantitative easing	4
2.1.1 Transmission Mechanism	4
2.1.2 Overview of Quantitative Easing in the World	5
2.2 Debt monetization	6
2.3 Case of the Czech National Bank	8
2.3.1 Concluding Remarks	9
3 Helicopter money	10
3.1 The Concept of Helicopter Money	10
3.1.1 Transmission channels	12
3.1.2 Money-financed Stimulus vs. Debt-financed Stimulus	12
3.1.3 Forms of implementation	13
3.1.4 Potential drawbacks	13
3.2 Propensity to consume	14
3.3 Literature review	15
3.3.1 Summary	18
4 Methodology	19
4.1 Data	19
4.1.1 Variables	21
4.2 Model	23

4.2.1	Publication Bias	25
4.2.2	Overview of the Models	27
5	Results	29
6	Conclusion	31
	Bibliography	35
A	Sources of MPC Estimates	I

List of Tables

4.1	Description of variables used in the models	22
4.2	Results of the publication bias test	25
4.3	AIC and BIC of the models	27
4.4	Regression Results	28
5.1	Czech values	29
5.2	Predicted MPC of Czech households	30

List of Figures

2.1	Total assets - Fed, ECB and BoJ	6
2.2	CNB's total assets (millions CZK)	8
3.1	Distribution of MPC	16
3.2	Countries by MPC	16
3.3	Average MPC across income and wealth	17
4.1	Estimates plotted against their precision	20
4.2	Parameter s plotted against MSE	24
4.3	Parameter s plotted against MSE	26

Acronyms

BoE Bank of England

CB Central Bank

CBDC Central Bank Digital Currency

CNB Czech National Bank

CZK Czech Koruna

EAPP Expanded Asset Purchase Program

ECB European Central Bank

EGGTRA Economic Growth and Tax Relief Reconciliation Act of 2001

Fed Federal Reserve System

FOMC Federal Open Market Committee

GDP Gross Domestic Product

LASSO Least Absolute Shrinkage Operator

MAS Monetary Authority of Singapore

MPC Marginal Propensity to Consume

QE Quantitative Easing

PDV Present Discounted Value

TFEU Treaty on the Functioning of the European Union

ZIRP Zero Interest Rate Policy

ZLB Zero Lower Bound

Chapter 1

Introduction

"Let us suppose now that one day a helicopter flies over this community and drops an additional \$1000 in bills from the sky, which is, of course, hastily collected by members of the community.

Let us suppose further that everyone is convinced that this is a unique event which will never be repeated." Friedman (1969)

Cited passage from Milton Friedman's 1969 book *The Optimum Quantity of Money and Other Essays* became notorious among monetary economists. However, the context of these words is known much less. Friedman's point of the parable was primarily meant as a digestible explanation of changes in the money supply, rather than a serious suggestion for a monetary policy; the sole outcome is higher price level. Couple of years later, the world found itself in an unprecedented economic situation. The Great Recession marked by the fall of Lehman Brothers in late 2008 transitioned into European debt crisis. The traditional prescription for recovery, stimulating the economy by sending official interest rates towards zero, was failing to deliver. Subsequently, the idea of stimulating the economic activity through the price-level by expanding central bank's balance sheet emerged. Though never formally executed, helicopter drop of money is one of those approaches. Economic theory speaks in favour of the policy. Buiter (2014) provides formal proof of helicopter money achieving surge in aggregate demand, no matter the current level of inflation, even under Ricardian equivalence. Galí (2020) stresses out the advantage of the transfer being of money-financed nature.

The objective and intended contribution of the thesis is to predict the average marginal propensity to consume the hypothetical transfer across Czech households. As debated later in the thesis, Consumption, which is the main

and the most reliable channel of helicopter money. Predicted MPC is therefore crucial for modelling the potential outcomes of the policy. As of August 2022, similar research has not been published. The motion is inspired by Eurosystem Household Finance and Consumption Survey (HFCS) and the follow-up study of surveyed microdata by Drescher *et al.* (2020). The practical part of the thesis is aimed at identifying country-level drivers of consumption, evaluating their effect through regression analysis and applying the findings in order to obtain plausible predictions for the Czech setting.

The thesis is structured as follows: Chapter 2 is devoted to the genesis, theory and practise of unconventional monetary policy. Policies similar to helicopter money — quantitative easing (QE), negative interest rate policy and debt monetization are then debated in detail. A brief overview of Czech National Bank's stance on unconventional monetary policy concludes the chapter. The issue of helicopter money is for the purpose of the scope of the thesis debated separately in Chapter 3. The policy and its key aspects are discussed. The latter part of the chapter reviews existing literature treating specifically the topic of MPC in the context of helicopter money. Chapter 4 describes methodology used; the data set and the four specifications of the model are introduced. Chapter 5 presents results — predicted average MPC of Czech households. Lastly, Chapter 6 presents conclusion of the thesis and comments on possible ways of further research.

Chapter 2

Unconventional Monetary Policy

The end of World War II marks beginning of a period which is from economist's point of view characterized by relatively steady GDP growth accompanied by positive policy rates in most market economies. Such setting instituted straightforward approach to monetary policy. The aim of monetary authority was to achieve low but positive inflation to support the economic growth. The main tool of inflation targeting were positive policy rates which could be lowered in order to avoid threatening or to suppress existing recession.

The aftermath of the financial crisis which broke out in 2007 displayed the need to expand the aforementioned monetary policy framework, as it proved inefficient under the zero lower bounds (ZLB). Solvency of numerous commercial banks was called into question. Instability of the financial system incurred disruption in the normally reliable mechanism between official interest rates and the market rates, pushing the central banks into finding other means for adjusting real market rates (Joyce *et al.* 2012). Taylor rules used by central banks as a guidance for setting the interest rates suggested negative values in many countries. It was the widespread close-to-zero policy rates, threatening deflation and the experience of the combination of the two from late 1990s Japan from which the ideas of unconventional monetary policy emerged as potentially the only viable tools central banks possess. Quantitative easing (QE) emerged "victorious" among other possibilities, as of its extent of worldwide implementation. Once regarded only as a hypothetical threat, a brief disruption at most, ZLB has become a normality couple of years later. In light of COVID-19 pandemic the world economy has dipped into a recession yet again, now under ZLB in Eurozone, USA, Great Britain and Japan.

Unconventional monetary policy is anything outside the traditional mone-

tary policy toolbox; anything beyond targeting inflation (and/or employment in special cases) by adjusting official rates by engaging in open market operations. Expansion of central bank's balance serving as a mean of guiding real market rates and/or inflation expectations is usually on display. This chapter is devoted to explaining theoretical approaches — similar to helicopter money — addressing monetary policy when conventional tools are found ineffective.

2.1 Quantitative easing

Quantitative easing is a practice carried out by the central banks, usually in times of inadvertently-low inflation, in order to boost demand and therefore invigorate GDP growth through a monetary transmission mechanism. Central banks increase the stock of fiat and use the money to purchase assets on the secondary market, usually long-term government bonds and private sector securities. The main goal of the policy is to reduce long-term interest rates, during the times of ZLB on policy rates. QE was firstly used in Japan in March 2001 as a measure of "zero interest rate policy" (ZIRP) during long-lasting period of conjoint stagnation of GDP and the price level between 1995 and 2007.

2.1.1 Transmission Mechanism

Joyce *et al.* (2012) describe two main channels through which QE projects into the economy — portfolio substitution channel and bank funding channel.

Portfolio substitution channel, similarly as in the case of helicopter money, is based on the imperfect substitutability of money. As the central bank purchases government securities and other long-term assets on the private market, private agents are pushed towards rebalancing their portfolios which in turn causes a rise in prices of such assets. In the end, liquidity with total value of the assets central bank acquired is provided to the financial system, causing further decline of long-term market interest rates.

The second mechanism, bank funding channel is deeply connected to the portfolio substitution channel. As government start purchasing assets on the private market, *ceteris paribus*, bank deposits rise. In general, additional liquidity demonstrates itself through improved access to bank credit, as banks are becoming more likely to broaden lending.

Efficiency of Quantitative Easing

Evaluating the effects of QE has become a key interest of monetary economists since its first formal implementation. Kapetanios *et al.* (2012) assess QE executed by the Bank of England over the year 2009. The authors findings suggest QE helped to reduce the extent of the recession in the country and helped to contain the inflation within positive numbers. Hausken *et al.* (2013) studies outcomes of the policy in Japan, UK, USA and the Eurozone. The author presents an evidence of QE's success in increasing inflation. However, no significant effect is measured in terms of GDP growth, except for the UK where QE prevented the fall in the GDP by 70 basis points. Interesting conclusion is drawn by Fabo *et al.* (2021), who point out inconsistency in reporting yields of QE between the monetary authority and the academia. Central bank economists tend to be more optimistic when assessing the effects of QE than their academic counterparts. Central bank research also reports significant effects more often and uses more favourable language. The question of whose research is more precise remains unclear.

2.1.2 Overview of Quantitative Easing in the World

Japan

Japan is the only country which engaged in QE prior to the Great Recession. During the first wave of QE (2001-2006) the balance sheet of the Bank of Japan (BoJ) rose by 30%, which is significantly lower volume compared to the post-crisis world. QE turned out not to be enough, therefore interventions on the foreign exchange market against the Japanese yen were launched in the spring of 2003. However, ongoing ZIRP kept interest rates low which motivated foreign agents to take loans in yen, appreciating Japanese currency to pre-interventions state (Iwata & Takagi 2012).

USA

As of August 2022, the Fed carried out total of four stages of quantitative easing. The first wave of QE, referred to as "credit easing" by the former chair Bernanke, was launched in November 2008 and consisted mainly of purchase of mortgage-backed securities. The Fed made a successful attempt at lowering mortgage interest rates and providing credit lines to this segment of the economy (Joyce *et al.* 2012). Another program aimed at reducing real non-standard

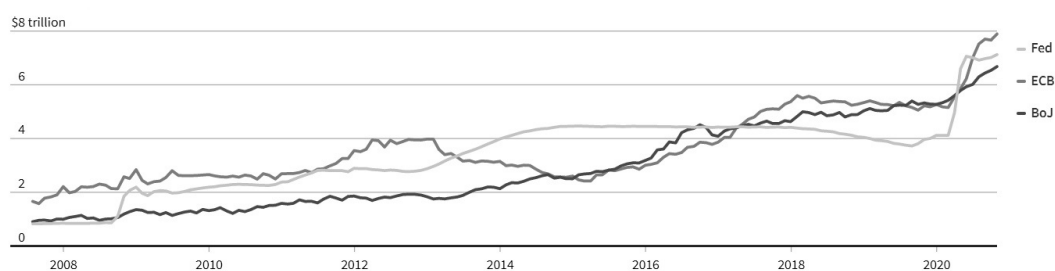


Figure 2.1: Total assets - Fed, ECB and BoJ

Source: Reuters (2022)

interest rates launched simultaneously was called "Operation Twist". The Fed was selling short-term government bonds and using the proceeds to buy bonds of long-term nature. The size of Fed's balance sheet remains unchanged under Operation Twist, the price of the long-term assets is driven up and thus the long-term interest rate is lowered in theory.

Eurozone

European Central Bank carried out the first large scale purchase of €250 billion in sovereign debt under Securities Markets Programme (SMP) in May 2010. Five years later in January 2015, in light of ongoing sub-target inflation, the Governing Council of the ECB introduced QE formally under the name Expanded Asset Purchase Programme (EAPP). Over the duration of the program which was scheduled to end by September 2016, €60 billion worth of government-backed securities was being bought by the ECB each month. However, the program continued with slight adjustments of the monthly volumes until 2018. In March 2020, with the arrival of COVID-19 pandemic, third wave of QE called Pandemic Emergency Purchase Programme (PEPP) has been launched and is up to this day yet to be ended.

2.2 Debt monetization

Debt monetization, also known as monetary financing, is a cooperative process between fiscal and monetary authorities. Government issues bonds which are instantaneously bought by the central bank which pays for them with purposefully newly issued base money. Schemed mechanism noticeably resembles QE. However, the two vary in both their means and ends. CBs acquire and sell government securities on the secondary-market the same way financial institutions

and individuals do. Furthermore, the central banks perform QE mainly in order to battle threatening deflation contrary to providing funding for expansionary fiscal policy as debt monetization.

Dowd (2018) mentions three main differences between debt monetization and helicopter drop of money. Firstly, it is the positive market value the bond has. Secondly, it is the government or its fiscal agents who decides where the newly obtained liquidity ends up. Thirdly, monetary financing faces different legal constraints than helicopter money.

Monetary financing is prohibited in the Eurozone as stated in Article 123 of the TFEU (Treaty on the Functioning of the European Union):

"Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States in favour of Union institutions, [...] central governments, regional, local or other public authorities, [...] shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments." Consolidated version of the Treaty on Functioning of the European Union (2012).

The formulation of the Article 123 clearly draws the sometimes blurry line between quantitative easing and monetary financing, as central banks of member states are able to purchase government bonds on the secondary market.

Similar approach can be observed within other countries. Debt monetization has been forbidden in the United States since the adoption of the Banking Act of 1935 with the exemption of the years 1942 - 1981, during which Federal Reserves Banks could purchase Treasury bonds on the primary market up to \$5 billion per one bank. Monetary financing is correspondingly prohibited in China and Japan.

Despite being illegal, monetary financing has undergone its little renaissance during the COVID-19 pandemic. The antitheses of modern western central banking, Monetary Authority of Singapore (MAS) engages in monetary financing regularly, as it is directly guided by the Singapore's government. Bank of England (BoE) temporarily extended Ways and Means facility in April 2020, promising to repay the overdraft at the BoE before the end of the year. Bank Indonesia executed debt monetization in July 2020 to provide the government with \$27.4 billion devoted to a COVID-19 related fiscal stimulus.

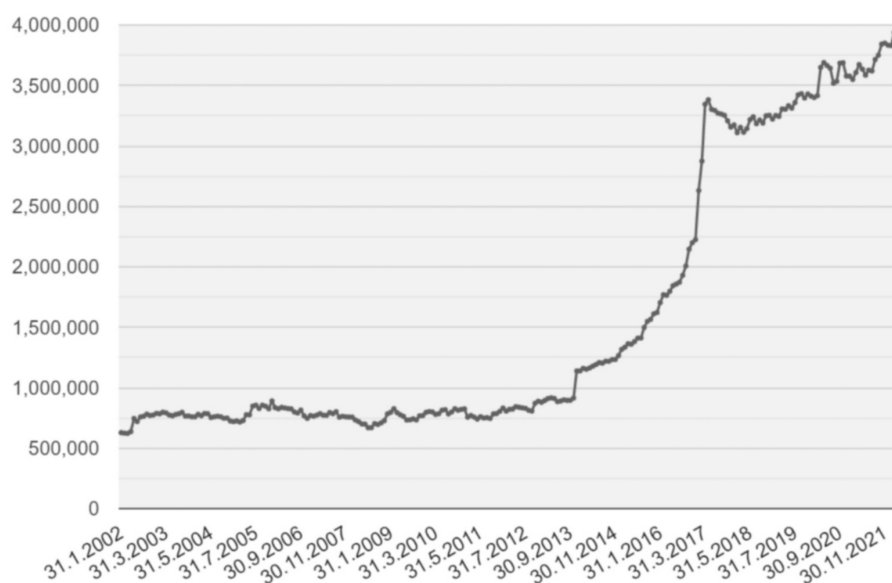


Figure 2.2: CNB's total assets (millions CZK)

Source: CNB (2022)

The potential risks of the practice are undesirable inflationary pressures. However, in his case study of Canada during the period 1935-1975, Ryan-Collins (2015) finds no support for a relationship between monetary financing and inflation. Furthermore, there appear to be no signs of increased inflation beyond reasonable deviations from the target in mentioned countries which could be assigned to monetary financing.

2.3 Case of the Czech National Bank

The monetary authority of the Czech Republic — Czech National Bank (CNB) has stayed rather conservative throughout the post-2007 episodes of economic disruptions. Seen as fairly independent, both in the eyes of the public and the academia, the CNB has been operating without using the two aforementioned measures. However, the foreign exchange interventions¹ to prevent the Czech koruna from strengthening might be considered an exception, as expansion of the size of CNB's balance sheet served as underlying premise of the practice.

The key interest rate set by CNB, two-week repo rate, approached ZLB

¹In CNB's research and policy notes, Franta *et al.* (2014) differentiate between foreign exchange interventions and exchange rate commitment. Although fundamentally the same, exchange rate commitment does not specify the volume of CZK which is to be sold, but rather aims to contain the exchange rate around chosen level for a limited period of time.

first in 2012. In 2013 CNB's internal analyses forecast the inflation to sink into negative numbers in early 2014. According to Franta *et al.* (2014), CNB assessed various possibilities of raising inflation under ZLB, namely QE, forward guidance and the exchange rate. In the end, using the exchange rate was chosen to combat the low inflation. Program called "Exchange Rate Commitment" was launched in November 2013. CNB also chose to announce the exact rate it was going to target — 27 CZK/€. CNB indeed achieved to contain the exchange rate around the targeted level (devaluation by 5-10% compared to the prior rate) until the end of the program in April 2017. During that time CNB's balance sheet almost quadrupled by newly issued fiat CZK on the liability side and by acquired euros and USD on the asset side (Figure 2.2).

2.3.1 Concluding Remarks

To conclude Chapter 2, it should be noted that the two approaches discussed in greater detail are only a tip of the iceberg of what is understood as unconventional monetary policy; QE and debt monetization were chosen as closest, already implemented, counterparts of helicopter money. Quantitative easing itself was executed in countless of more or less distinguishable forms, usually to provide credit lines to specific a part of the economy.

Foreign exchange interventions are another potent measure though usually used in times of positive interest rates; only the Bank of Japan, Swiss National Bank and the Czech National Bank chose to implement the policy under ZLB. Monetary authority might as well choose to let the interest rate sink into the territory of negative interest rates. Agarwal & Qian (2014) introduce and further specify mechanisms which empower central banks to end the recession in a short time if it enables negative rates. Another frequently used approach, which differs completely from every mechanism mentioned above is forward guidance — central bank's communication towards the public specifically targeted at forming agents' expectations about future development of the economy. Forward guidance usually goes hand in hand with various unconventional monetary policies to ensure their outcomes. Last major tool used for decreasing the market interest rates are targeted longer-term refinancing operations (TLTRO). By engaging in TLTROs banks are granted loans under the condition of expanding public's access to credit.

Chapter 3

Helicopter money

In the key work on helicopter money *The Helicopter Money: Why It Works — Always* Buiter (2014) defines helicopter money as:

"temporary fiscal stimulus (tax cut or increase in public spending) funded through an increase in the stock of fiat base money that is never completely reversed in present discounted value (PDV) terms",

This interpretation broadens what is understood as helicopter money in the latter parts of the thesis, as monetary financing and money-financed tax cuts fit into Buiter's definition as well. The nuance between monetary financing and helicopter money was pointed out in Chapter 2. Money-financed tax cut is fundamentally the same approach as direct helicopter drop of money.

3.1 The Concept of Helicopter Money

The thesis works with the definition of helicopter money narrowed solely to a money-financed transfer in form fiat or CBDC to households aimed to revive consumption. Borio *et al.* (2016) specify the concept more suitably as:

"[...] increase in economic agents' nominal purchasing power in the form of a permanent addition to their money balances."

The idea of helicopter money emerges from the most simple power central banks possess: the unique possibility of issuing new fiat money with negligible costs without greater limitations. When conducting helicopter drop of money over the population, central bank increases its stock of base money i.e. expands the liability side of its balance sheet by a value of the money it chose

to redistribute. Increase in the stock of fiat has consequently an effect on interest rates, price level, financial and real asset prices and the overall economic activity (except in situation of permanent liquidity trap). Buiter (2014) attributes this response to the unique aspect of fiat money — its imperfect substitutability. Fiat's liquidity, legal tender status and creditworthiness of its issuer differentiate it from any other financial and real assets.

Windfall gains from money-financed transfer not only affect aggregate demand directly by relaxing households' budget constraint, but inflation expectations might rise in the process. Higher inflation expectations lower the real interest rates which is key especially for getting out of recession under the zero lower bound on policy rates. To retain parity of assets and liabilities on the balance sheet, CB theoretically acquires assets with book value of the helicopter drop and market value of zero in the process.

Buiter (2014) builds a formal model on the top of four conditions that need to be satisfied for helicopter money to be effective in boosting aggregate demand:

- The increase in the stock of base money is never completely reversed in present discounted value (PDV) terms.
- There must be benefits from holding additional fiat base money other than its pecuniary rate of return.
- Fiat base money is irredeemable: they are viewed as an asset by the holder but not as a liability by the issuer.
- Price of money is positive.

All of the conditions are rather formal ones. Simply put, the one-time increase in agents' income needs to be either permanent or at least never completely reversed in PDV terms. As of the second condition, despite fiat being rate-of-return-dominated by other risk-free assets such as government bonds, the aforementioned non-pecuniary properties cause it to be willingly held by the public.

Buiter (2014) comes to important conclusion, that if the stated conditions are met, there always exists a combined monetary and fiscal policy action which boosts private demand regardless the level of inflation. Using a rigorous model, Buiter (2014) further argues that a permanent stimulus of irredeemable fiat boosts demand both when Ricardian equivalence holds and both when it does not.

3.1.1 Transmission channels

According to (Bernanke 2016), there are four main channels through which Money-Financed Fiscal Program, Bernanke's name for broader version of helicopter money, influence the economic activity:

- the direct effects of the public works spending on GDP, jobs, and income;
- the increase in household income from the rebate/transfer, which should induce greater consumer spending;
- a temporary increase in expected inflation, the result of the increase in the money supply. Assuming that nominal interest rates are pinned near zero, higher expected inflation implies lower real interest rates, which in turn should incentivize capital investments and other spending;
- the fact that, unlike debt-financed fiscal programs, a money-financed program does not increase future tax burdens.

3.1.2 Money-financed Stimulus vs. Debt-financed Stimulus

Fiscal stimulus of various forms is one way fiscal authority is able to stimulate economic activity through boosting the aggregate demand. Fiscal stimuli carried out in modern economies are usually of debt-financed sort; the government issues bonds which are sold on the secondary market in order to overcome liquidity constraint it faces when performing the stimulus. Such practise increases nation's debt and narrow State's fiscal space for the future. The outcomes of money-financed stimulus — helicopter money, debt monetization and arguably quantitative easing — differs from their counterpart mainly due to underlying expansion of the monetary base.

Galí (2020) examines the two approaches both during "normal times", when the conventional monetary policy is effective, and under ZLB on the nominal interest rate. In general, money-financed fiscal stimulus is an effective mean of boosting economic activity as long as prices in the economy are reasonably sticky. There are no further adverse side effects, apart from temporary mild rise in inflation, which is often desirable especially under ZLB. Furthermore, money-financed stimulus can be designed so that debt and taxes do not need to rise, either in the short run or the long run. Money-financed stimulus surpasses its debt-financed counterpart in both aforementioned situations. However, the difference gets smaller under binding ZLB (Galí 2020).

Buiter (2014) argues that monetized fiscal stimulus is more expansionary than a debt-financed one because monetized expansion of central bank balance sheet is profitable: it creates fiscal space for the State.

3.1.3 Forms of implementation

As there will always be certain degree of redistribution tied with the policy, it might be preferred that the policy is conducted by the fiscal authority. Both Bernanke (2016) and Belke (2018) suggest executed helicopter money as a tax-cut financed by a CB's balance sheet expansion.

The second option is central banks acting on its own. Muellbauer (2014) stresses out it is to be preferred that central banks conduct helicopter money without any cooperation with the government, as the public is likely to digest independent central bank handing out cash as a mean of meeting inflation target better than in case of the government doing it. Latter-cited studies finds no support for this motion, at least as far propensity to consume the transfer in question and inflation expectations go.

Hampl & Havranek (2018) argues that when conducting helicopter money, central bank digital currency (CBDC) should be used. From practical point of view, implementation costs are negligible. Each citizen could create his own personal blockchain wallet to which only the central bank could send digital CBDC. Once the digital currency, created by an expansion of the liability side of CB's balance sheet arrive on the wallet, the consumer could spend or exchange the money for fiat. This mechanism could introduce one interesting aspect. The time span over which CBDC on the wallets could be used might be limited, e.g. to 3 months, ensuring instantaneous effect on the aggregate demand.

3.1.4 Potential drawbacks

Helicopter money is necessarily tied with redistribution of money — typical fiscal policy domain. As debated later in the thesis, to meet the ends of the policy accordingly, lower-income families should moreover receive larger stimulus than the higher-income ones. One might therefore argue that the cornerstone of political economy, dichotomy of fiscal and monetary policy, is violated or at least bypassed. Such occurrence could lead to tensions between governments and CBs, potentially resulting in a more extensive interference into CB's independence (Dowd 2018).

Bernanke (2016) suggests solution for this issue which can be effortlessly extended to other countries. In the case of United States, Congress could create a special Treasury account at the Fed and give Federal Open Market Committee (FOMC) the sole authority to manage it. The account would be generally empty until the Fed would use its authority to add funds, based on the FOMC's assessment that money-financed fiscal program (e.g. helicopter money) is needed to achieve Fed's employment and inflation goals.

Helicopter drop of money directly to the consumers could in their eyes undermine CB's credibility. One-time tax-cut, e.g. one month tax break for workers, funded through and increase in the stock of fiat money seemingly serves the purpose of helicopter money and bypasses the problem of credibility. Budget constraints of the households are indeed for a limited period of time relaxed. However, shift in their behaviour towards spending for the time being remains questionable.

Lastly, helicopter drop of money is in its nature irreversible. Monetary authority is able to issue and redistribute new fiat, but it is unable to demand the money back. This does not hold for QE, at least at the theoretical level. Both Fed and the ECB have recently expressed their commitment to starting reducing their balance sheets enlarged by QE programs once the time is right. In case of helicopter money, the increase on the assets side — asset with market value of zero — can not be sold.

From the beneficiary's point of view there are seemingly no costs of such policy, the more so when CBDC is used. However, Dowd (2018) stresses out opportunity costs in form of forgone seigniorage profits. Central bank could use additional base money to acquire bonds promising future payments instead of redistributing them among individuals.

3.2 Propensity to consume

The question whether helicopter money, as in form defined above, would work remains unbacked by experience from prior implementation. In reality, the efficiency of the policy could be undermined by a money-financed version of the phenomenon called Ricardian equivalence. Ricardian equivalence is a hypothesis stating that fiscal programs deepening government's deficit fail to stimulate aggregate demand, as the public sees them in light of future increase in taxes. Unfortunately, no survey of public opinion with tangible results on central bank's balance sheet expansion exists.

Nonetheless, let us suppose that all three main channels proposed by Bernanke (2016) fail to deliver. That means helicopter money performance is underwhelming in terms of instantaneous rise in private spending, rise in inflation expectations and what is more, it creates fears of higher tax burden in the future. In spite of all that, the redistributed fiat would always find its way to project itself into bank deposits, replicating the bank funding channel of quantitative easing. This effect in general lowers market interest rates and improves private access to credit.

Basic conclusion about the MPC of hypothetical money-financed transfers can however be drawn based on comparison with debt-financed stimuli. Johnson *et al.* (2006) present evidence from the USA of 20-40% of the tax rebates under the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGGTRA) being spent in three months after receiving the money. This fiscal program resembles helicopter money, as it was targeted to ameliorate the ongoing mild recession. Eventually about 2/3 of US households were rebated the amount of \$300, \$500 or \$600 depending on the marital status. Parker *et al.* (2013) draw similar conclusion in their study of analogous 2008 US tax rebates. Leigh (2012) reports 40% of the households included in 2008/09 Australian tax rebate spend the whole stimulus, while 24% saved the money and 36% used it to pay off debt.

Case for itself is the type of helicopter money implemented in Singapore, which are due to unusual setting of monetary and fiscal authorities in the country of money-financed and debt-financed sort simultaneously. Despite having 12th largest debt-to-GDP ratio in the world of 109.37% (World Population Review 2022), the Government of Singapore occasionally redistributes profits flowing to treasury from invested reserves. In February 2011, Singapore's Ministry of Finance announced efforts to share nation's past year's economic growth. Agarwal & Qian (2014) find MPC of 80% within the 10-month period of transfer ranging from \$78 to \$702 distributed on the basis of person's wealth.

3.3 Literature review

The thesis is inspired by following research papers and studies, which estimate households' marginal propensity to consume one-time transfers around Europe through elaborate surveys.

Jappelli & Pistaferri (2014) analyze the results of the *2010 Italian Survey of Household Income and Wealth* on 7,951 households, focused on the con-

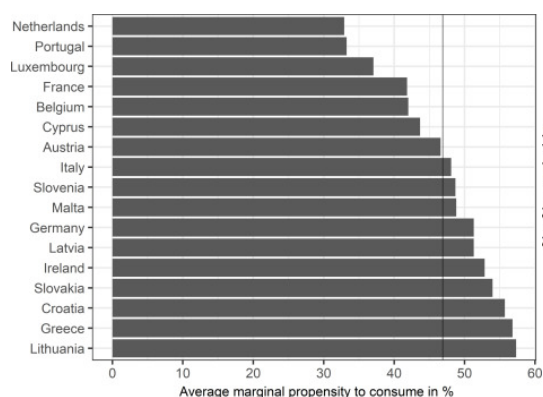


Figure 3.1: Distribution of MPC

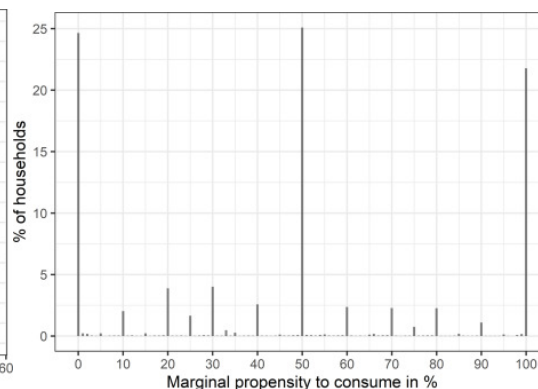


Figure 3.2: Countries by MPC

Source: Drescher *et al.* (2020)

sumption of an unexpected transitory income change of the value equal to the amount household earns monthly. Several crucial conclusions are drawn. First, average MPC throughout the economy was measured to be 48%. Second, potentially more important, the evidence of MPC declining immensely in wealth is presented. The households with low cash-on-hand exhibit substantially higher MPC than the affluent ones. Such heterogeneity in MPC is demonstrated by the 25-30 percentage point increase in MPC when comparing the highest cash-on-hand quintile with the lowest one. Third, MPC distribution is relatively flat over a one's lifetime. Lastly, in line with the second result, higher MPC is correlated with being turn down for credit.

Rooij & de Haan (2019) conduct similar survey. In their study of views of 2,223 Dutch households on helicopter money, they asked how would the household divide obtained €500 and €2000 between donations, consumption, savings, investments and redemption of a mortgage/debt. In addition, the survey tests whether the source of money — ECB or the government — makes difference in household's behaviour. The survey reports MPC of 30% on average. Spending is measured to decrease with size of the transfer from 34% (of €500) to 28% (of €2000). Interestingly, source of the transfer is unimportant for the households' decision making. Furthermore, the relationship between respondent's monetary policy knowledge and his MPC is measured; no strong evidence is found. Lastly, helicopter money, at least in this extent, has hardly any effect on the inflation expectation.

Djuric & Neugart (2019) survey German population in similar manner. Authors divide respondents into four groups and introduce each different a scenario resulting in a €1200 windfall gain for the household: lottery win, gov-

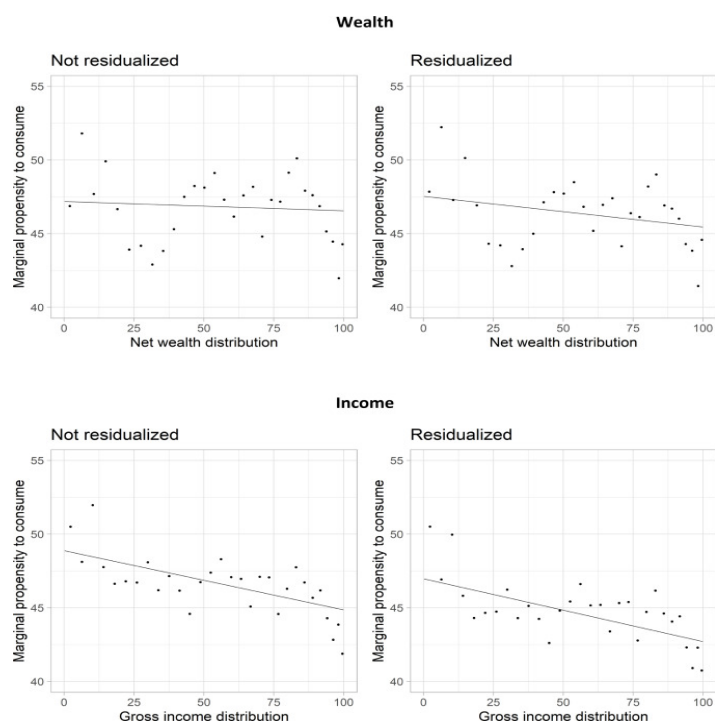


Figure 3.3: Average MPC across income and wealth

Source: Drescher *et al.* (2020); each dot represents about 4.2 million households and is calculated based on about 1930 observations, net wealth and gross income are cdfs. Residualized plots control for country dummies, household size, age, dummy indicating that at least one person living in the household is 65 years or older, income in the case of wealth and wealth in the case of income.

ernment one-time transfer, ECB one-time transfer and ECB transfer of €100 monthly spanning over a year. Authors report average MPC of about 40% (38% in case of the third group which is the most important one for the thesis). Spanning the transfer over the year was measured to decrease consumer's MPC by approximately 2 p.p. The (re)distributor of €1200 (ECB and the Federal Government of Germany) barely influences consumer's MPC. Evidence for Ricardian equivalence is found, when transfers and lottery win are compared. However, according to the authors, the share of Ricardian households appears too small to make a difference in the policy treatments.

Drescher *et al.* (2020) present the most relevant research on the topic based on *2017 Eurosystem Household Finance and Consumption Survey* carried out in Eurozone states (excluding Estonia) and Croatia. In all the countries the same question is asked:

"Imagine you unexpectedly receive money from a lottery, equal to the amount of income your household receives in a month. What

percent would you spend over the next 12 months on goods and services, as opposed to any amount you would save for later or use to repay loans?"

Average marginal propensity to consume the hypothetical transfer was measured ranging from 33% in Netherlands to 57% in Lithuania (Figure 3.1). Additionally strong heterogeneity was found across the MPC, as about 3/4 of the respondents chose to consume either nothing, half of the transfer or the whole amount (Figure 3.2). MPC is shown to decline with net wealth but particularly with gross income (Figure 3.3)

3.3.1 Summary

The existing literature presents several crucial points which need to be taken into account if the central bank decides to launch helicopter drop of money. First, marginal propensity to consume the windfall net increase in income is substantial. For comparison, noa (2000) reports MPC out of net worth ranging from 0.02 to 0.05 and MPC out of housing wealth between 0.03 and 0.16. Second, MPC decreases with income and wealth. The central bank should therefore consider redistributing higher sums among the lower-income class in order to reach the full potential of the policy. Third, MPC decreases with the size of the transfer; more smaller waves of helicopter money would be more efficient than one large, at least in terms of instantaneous effect on consumption. Lastly, different types of implementation do not bring significantly different results; similar levels of MPC are reported in case of lottery win and a transfer distribute by the ECB.

Chapter 4

Methodology

As mentioned before, the goal and the intended contribution of the thesis is to predict average marginal propensity to consume transfers of Czech households. To accomplish this goal, meta-analytic¹ approach is used; total of 576 estimates of MPC from 21 studies and 21 countries is extracted and further analyzed.

The thesis is not primarily aimed at identifying key drivers of consumer spending or explaining causality between MPC and macroeconomic variables — best described in general economic theory of Friedman (2018) or Keynes (2018) and current research, e.g. Dossche *et al.* (2018). The first part of the chapter is devoted to the description of the data and variables used in the model. The second part introduces models constructed for obtaining the predictions.

4.1 Data

Meta-analysis Havranek & Sokolova (2020) studies among other things consumption response to income changes. In doing so, authors obtained estimates of MPC from studies on households' behaviour in the context of tax rebates and other one-time net increases in income (see Appendix A). The amount received varies from \$200 to about \$1000 throughout the studies from which estimates of MPC are taken. The time span over which specific portion of the transfers was spent ranges from one month to half a year, three month being the mode. In all cases, the net-increase in income is provided by the government. Estimates of MPC are extracted from authors' data set along with its standard

¹Meta-analysis is a research process used to systematically synthesise or merge the findings of single, independent studies, using statistical methods to calculate an overall or "absolute" effect (Egger & Smith 1997). One of the most cited meta-analysis in the field of economics are e.g. Doucouliagos & Ulubaşoğlu (2008) or Havranek & Irsova (2011).

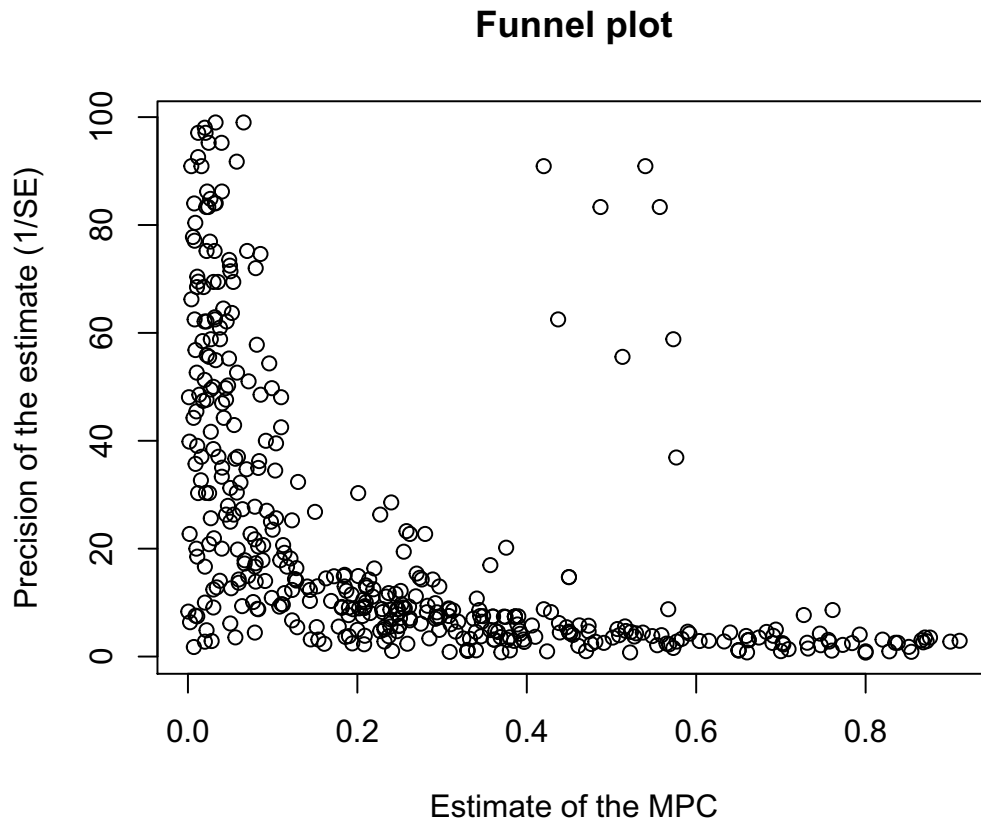


Figure 4.1: Estimates plotted against their precision

Note: Estimates with $\frac{1}{SE} > 100$ were included in the regression but not in the figure for the sake of readability. The outliers in the plot demonstrating combination of high MPC and high precision were reported by Drescher *et al.* (2020) and were not included in Havranek & Sokolova (2020) due to being released later.

errors and added to surveyed MPCs from Jappelli & Pistaferri (2014), Djuric & Neugart (2019), Rooij & de Haan (2019) and Drescher *et al.* (2020). The procedure is analogous to benefit transfer method often used in environmental economics². Through information about country and the year the transfer was received (hypothetical transfer in case of surveys), each estimate is linked to a set of country-level explanatory variables.

²Benefit transfer method takes exact values, variables, functions or other characteristic features from a certain study and works them into the new study.

4.1.1 Variables

After the process of discarding several multicollinear variables, total of eighteen explanatory variables were chosen to be included in the baseline model. All the explanatory variables (Table 4.1) were chosen specifically to meet the condition of time-invariance. Such setting allows us to treat the data as cross-sections. Among classical macroeconomic indicators which explain propensity to consume transfers on a country level, several non-economic indexes were included, namely Rule of Law index and Geert Hofstede's cultural dimensions similarly to Havranek & Sokolova (2020). Variable `mpc_se` — standard error of the estimate — is used in two settings of the model to control for publication bias present in the MPC estimates. The funnel plot (Figure 4.1) serves to examine this effect of informally. No "funnel" shape is to be seen in the figure which indicates publication bias (Begg 1994).

Table 4.1: Description of variables used in the models

Code	Definition and source
mpc	Estimate of the marginal propensity to consume (Havranek & Sokolova 2020).
mpc_se	Standard error of the MPC estimate (Havranek & Sokolova 2020).
GDPPCgrowth	GDP per capita growth (annual %) (World Bank 2022).
inf	Inflation - GDP deflator (annual %) (World Bank 2022).
unemp	Unemployment, total (% of total labor force) (World Bank 2022).
Gini	Gini index (World Bank 2022).
polrate	Central bank policy rates (year average %) (Bank for International Settlements 2022).
GDPPCtoworld	Ratio of country's GDP per capita and GDP per capita of the world (World Bank 2022).
taxtoGDP	Tax revenue (% of GDP) (World Bank 2022).
govdebttoGDP	Debt-to-GDP ratio (OECD 2022).
agricytoGDP	Agriculture, forestry, and fishing, value added (% of GDP) (World Bank 2022).
gsavingstoGDP	Gross savings (% of GDP) (World Bank 2022).
ruleoflaw	Rule of law index (0 - 1) (World Justice Project 2022).*
powdist	Power distance (0 - 100) (Hofstede Insights 2022).*
individ	Individualism vs. collectivism (0 - 100) (Hofstede Insights 2022).*
mascul	Masculinity vs. femininity (0 - 100) (Hofstede Insights 2022).*
unceravoid	Uncertainty avoidance (0 - 100) (Hofstede Insights 2022).*
ltorient	Long-term orientation vs. short-term orientation (0 - 100) (Hofstede Insights 2022).*
indulg	Indulgence vs. restraint (0 - 100) (Hofstede Insights 2022).*

*variables constant for specific country over time

4.2 Model

To obtain predictions for marginal propensity to consume transfers of Czech consumer, four settings of weighted least squares model were constructed. The weight of each estimate is always set to $\frac{1}{n}$, where n is the number of estimates from a given country included in the data set. Countries are therefore represented equally in the regression.

Weighted Least Squares - Full Model

Firstly, the baseline model which does not control for publication bias is estimated (4.1).

$$\begin{aligned}
 mpc_i = & \beta_0 + \beta_1 GDPPCgrowth_i + \beta_2 inf_i + \beta_3 unemp_i + \beta_4 Gini_i \\
 & + \beta_5 polrate_i + \beta_6 GDPPCtoworld_i + \beta_7 taxtoGDP_i + \\
 & + \beta_8 govdebttoGDP_i + \beta_9 agrictoGDP_i + \beta_{10} gsavingstoGDP_i + \\
 & + \beta_{11} ruleoflaw_i + \beta_{12} powdist_i + \beta_{13} individ_i + \beta_{14} mascul + \\
 & + \beta_{15} unceravoid_i + \beta_{16} ltorient_i + \beta_{17} indulg_i + u_i
 \end{aligned} \quad (4.1)$$

Weighted Least Squares - LASSO Regularization

To ensure the relevance of the explanatory variables included in the regression, avoid over-fitting and to eliminate multicollinearity, least absolute shrinkage and selection operator (lasso) (Equation 4.2) is applied onto the baseline model (4.1). This technique used combines the advantages and to some extent solves drawbacks of subset selection and ridge regression, the two historically prevalent regularization methods (Tibshirani 1996).

$$\hat{\beta} = \underset{\beta}{\operatorname{argmin}} \sum_{i=1}^n \left(y_i - \sum_{j=1}^k \beta_j x_{ij} \right)^2 \quad \text{subject to} \quad \sum_{j=1}^k |\hat{\beta}_j| \leq t \quad (4.2)$$

Lasso goes through the interval $\left[0, \sum_{j=1}^k |\hat{\beta}_j| \right]$ and finds possible sets of explanatory variables used for the regression. The final set of regressors is identified through consecutive cross-validation, which indicates a point of the interval where mean squared error of the model (MSE) reaches its minimum (Figure 4.2).

For the purpose of running 10-fold cross-validation `cv.lars` function from

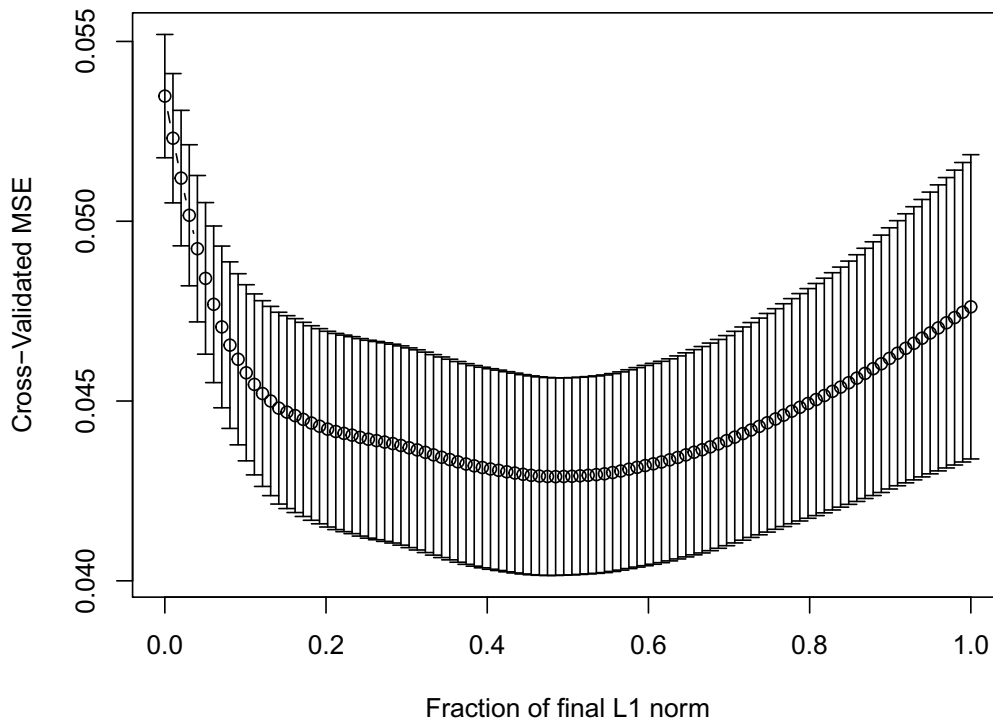


Figure 4.2: Parameter s plotted against MSE

R package *lars* is used. Supposing $\sum_{j=1}^k |\hat{\beta}_j| > 0$ and restricting the tuning parameter t to only meaningful values between $\left[0, \sum_{j=1}^k |\hat{\beta}_j|\right]$, let us define $s \in [0, 1]$ as a fraction of the final L1 norm, i.e.,

$$s = \frac{t}{\sum_{j=1}^k |\hat{\beta}_j|} \quad (4.3)$$

Cross-validation indicates that the mean squared error (MSE) of the model is at its minimum of 0.043 for $s = 0.485$ (Figure 4.2). The lasso algorithm subsequently eliminates variables *taxtoGDP*, *agrictoGDP* and *ltorient* compared to the baseline regression equation.

4.2.1 Publication Bias

To inspect the presence of publication bias formally, the method of regressing standard normal deviate (estimate divided by its standard error) on the precision of the estimate (1/standard error) proposed by Egger *et al.* (1997) is employed (Equation 4.4). We test $H_0: \beta_0 = 0$; meaning there is no publication bias against $H_1: \beta_0 \neq 0$ i.e. publication bias is present.

$$\frac{mpc_i}{SE(mpc_i)} = \beta_0 + \beta_1 \frac{1}{SE(mpc_i)} + u_i \quad (4.4)$$

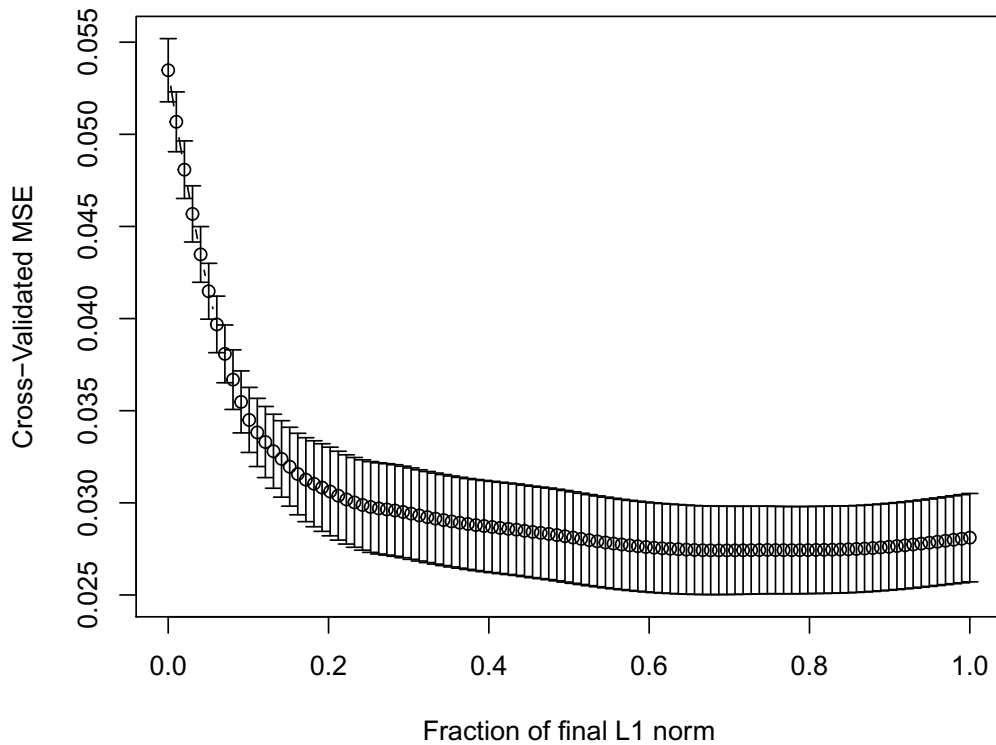
The results of the regression are summarized below (Table 4.2). As the estimator of the intercept is positive and statistically significant, we're able to conclude that there truly is a publication bias present in the reported MPC.

Table 4.2: Results of the publication bias test

	<i>Dependent variable:</i>
	mpc/mpc_se
Constant	9.001*** (2.381)
Observations	576
R ²	0.000
Adjusted R ²	0.000
Residual Std. Error	57.145 (df = 575)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Weighted Least Squares

To control for publication, variable *mpc_se* — standard error of the estimate — is added into the regression equation (Equation 4.5). The new model is then estimated.

Figure 4.3: Parameter s plotted against MSE

$$\begin{aligned}
 mpc_i = & \beta_0 + \beta_1 mpc_se + \beta_2 GDPPCgrowth_i + \beta_3 inf_i + \beta_4 unemp_i + \\
 & + \beta_5 Gini_i + \beta_6 polrate_i + \beta_7 GDPPCtworld_i + \beta_8 taxtoGDP_i + \\
 & + \beta_9 govdebttoGDP_i + \beta_{10} agrictoGDP_i + \beta_{11} gsavingstoGDP_i + \\
 & + \beta_{12} ruleoflaw_i + \beta_{13} powdist_i + \beta_{14} individ_i + \beta_{15} mascul + \\
 & + \beta_{16} unceravoid_i + \beta_{17} ltorient_i + \beta_{18} indulg_i + u_i
 \end{aligned} \tag{4.5}$$

Weighted Least Squares — LASSO Regularization

The procedure of constructing the second model described above is then replicated, now with the inclusion of mpc_se in the regression (Equation 4.5). Cross-validated MSE of the model is at its minimum of 0.0274 for $s = 0.77$ (Figure 4.3) — controlling for publication bias thus results in a drop in MSE by roughly a third compared to the value from the second setting of the model. There is also a drop in the range of confidence intervals of the MSEs observ-

Table 4.3: AIC and BIC of the models

	WLS	LASSO	WLS - PB	LASSO - PB
AIC	-167.53	76.05	-333.12	-336.98
BIC	-84.77	145.75	-246.01	-258.57
df	19	16	20	18

able when comparing the two figures. The lasso algorithm ultimately eliminates variables *taxtoGDP* and *ltorient* from the regression equation 4.5.

4.2.2 Overview of the Models

Breusch-Pagan test finds evidence for heteroskedasticity in all four models. Possible source of this phenomena are outliers present in the data set. As the models are estimated on a large sample of data, White's standard errors and corresponding t-statistics are computed table to remedy the issue and presented in the summary (Table 4.4).

To perform model selection, Akaike information criterion (AIC) and Bayesian information criterion (BIC) are computed (Table 4.3). AIC and BIC indicate the fourth model — lasso-based OLS controlling for publication bias — as the overall best of the four.

As of estimated values of the beta-coefficients several results are worth noting. Households tend to spend more during the times when the economy is performing well. Higher inflation and/or unemployment have both positive effects on household's MPC as well. As expected, lower average MPC across the population is found in countries with higher values of Gini coefficient. Another obvious observation is declining MPC under higher level of policy rates. Changes in government debt, share of tax revenue on GDP and Hofstede's cultural dimension have hardly any effect on households' spending.

Table 4.4: Regression Results

	<i>Dependent variable:</i>			
	mpc			
	WLS	LASSO	WLS - PB	LASSO - PB
	(1)	(2)	(3)	(4)
mpc_se			0.652*** (0.074)	0.655*** (0.071)
GDPpcgrowth	0.015*** (0.005)	0.001 (0.005)	0.015*** (0.004)	0.015*** (0.003)
inf	0.042*** (0.012)	0.074*** (0.013)	0.038*** (0.012)	0.038*** (0.012)
unemp	0.039*** (0.004)	0.031*** (0.006)	0.037*** (0.004)	0.037*** (0.004)
GINI	-0.019*** (0.002)	-0.012*** (0.003)	-0.023*** (0.002)	-0.023*** (0.002)
polrate	-0.015*** (0.005)	-0.043*** (0.004)	-0.033*** (0.005)	-0.033*** (0.006)
GDPpctoworld	-0.006 (0.007)	0.003 (0.012)	-0.003 (0.007)	-0.003 (0.009)
taxtoGDP	0.001 (0.003)		0.0002 (0.003)	
govdebttoGDP	-0.001** (0.0004)	-0.001** (0.001)	-0.001** (0.0005)	-0.001** (0.0004)
agricytoGDP	-0.098*** (0.012)		-0.081*** (0.013)	-0.080*** (0.012)
ruleoflaw	-0.756** (0.302)	-0.963* (0.540)	-0.713** (0.332)	-0.708** (0.348)
gsavingstoGDP	-0.001 (0.003)	0.009*** (0.002)	-0.002 (0.003)	-0.001 (0.002)
powdist	-0.005*** (0.001)	-0.003*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
individ	0.001 (0.0004)	0.002*** (0.001)	0.001*** (0.0004)	0.001*** (0.0004)
mascul	-0.0004 (0.0005)	0.001** (0.001)	-0.0002 (0.001)	-0.0002 (0.0005)
unceravoid	-0.001 (0.001)	0.001* (0.001)	-0.0003 (0.001)	-0.0002 (0.0005)
ltorient	0.001 (0.001)		0.0001 (0.001)	
indulg	-0.003*** (0.001)	-0.0004 (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Constant	1.890*** (0.312)	0.972* (0.544)	1.956*** (0.367)	1.948*** (0.348)
Observations	576	576	576	576
R ²	0.891	0.832	0.919	0.919
Adjusted R ²	0.888	0.828	0.916	0.916

*p<0.1; **p<0.05; ***p<0.01

Chapter 5

Results

The four specifications of the baseline model are used to make a prediction on how much out of the fiscal/monetary transfer is Czech household likely to spend on average. There is a total of four years in the post-socialism era during which the tool of helicopter money could have been brought into play. The years 2010, 2011, 2015 and 2016 are all marked by sub-target inflation or deflation and close-to-zero discount rate set by CNB. Country-level characteristics are obtained (Table 5.1) and plugged into corresponding equations.

Table 5.1: Czech values

	2010	2011	2015	2016
GDPpcgrowth	2.14	1.55	5.18	2.34
inf	-1.43	-0.021	0.99	1.14
unemp	7.28	6.71	5.05	3.95
GINI	26.6	26.4	25.9	25.4
polrate	0.83	0.75	0.05	0.05
GDPpctoworld	2.08	2.08	1.74	1.80
taxtoGDP	13.65	14.52	14.77	14.91
govdebttoGDP	37.1	39.7	39.7	36.6
agrictoGDP	1.54	1.98	2.21	2.09
ruleoflaw	0.74	0.74	0.74	0.74
gsavingstoGDP	22.66	22.46	27.09	26.35
powdist	57	57	57	57
individ	58	58	58	58
mascul	57	57	57	57
unceravoid	74	74	74	74
ltorient	70.03	70.03	70.03	70.03
indulg	29.46	29.46	29.46	29.46

Table 5.2: Predicted MPC of Czech households

	WLS	LASSO	WLS - PB	LASSO - PB
2010	0.466 (0.417, 0.515)	0.267 (0.215, 0.318)	0.478 (0.436, 0.520)	0.479 (0.438, 0.520)
2011	0.454 (0.420, 0.487)	0.353 (0.316, 0.389)	0.471 (0.442, 0.500)	0.472 (0.445, 0.500)
2015	0.485 (0.461, 0.510)	0.459 (0.432, 0.486)	0.513 (0.492, 0.535)	0.515 (0.496, 0.534)
2016	0.430 (0.405, 0.455)	0.436 (0.411, 0.461)	0.462 (0.440, 0.484)	0.464 (0.446, 0.482)

Let us label the specific realizations of the independent random variables c_1, \dots, c_k . The prediction θ is obtained as follows:

$$\theta \equiv E(mpc|x_1 = c_1, \dots, x_k = c_k) = \hat{\beta}_0 + \hat{\beta}_1 c_1 + \dots + \hat{\beta}_k c_k \quad (5.1)$$

Each of the predictions θ is then used in the regression (Equation 5.2) in order to obtain its 95%-confidence interval.

$$mpc = \theta + \beta_1(x_1 - c_1) + \dots + \beta_k(x_k - c_k) + u \quad (5.2)$$

The final results are presented in the Table 5.2. The fourth specification of the model seems to be the most reliable one. It controls for publication bias, underwent variable selection via lasso and was indicated as the overall best by AIC and BIC.

Czech households would devote on average the shares of about 0.48, 0.47, 0.52, and 0.56 respectively of the helicopter money transfer to consumption during the years in question. That puts Czech Republic among the Eurozone countries mentioned in Drescher *et al.* (2020) where higher values of MPC were reported. Eurozone household were however surveyed during 2017 under different economic setting.

Chapter 6

Conclusion

The thesis discusses the topic of helicopter drop of money; type of unconventional monetary policy aimed at meeting the inflation target and/or boosting GDP growth during times of sub-target inflation and under zero lower bound on policy rates. Similarly to quantitative easing, the prevailing tool in the current monetary policy framework, the underlying premise of the policy is an expansion of the central bank's balance sheet. However, helicopter money affects the output directly, mainly through an increase in private consumption, contrary to QE's transmission mechanism.

From the perspective of the households, helicopter money is a windfall gain; one-time net increase in income. Both economic theory and current research indicate that the hypothetical transfer household receives is projected reliably into consumption and thus aggregate demand. Moreover, strong surveys on exceptional government-facilitated transfers report much higher MPCs compared to permanent marginal increases in income or wealth. Helicopter money is an efficient unconventional monetary policy tool.

As all approaches to monetary policy under the zero lower bound, helicopter money is tied with several drawbacks. The policy circumvents the fiscal-monetary dichotomy and is in its nature irreversible. The biggest issue is however the danger of damaging the credibility of the monetary authority. The best demonstration of this caveat is the case of former chair of the Fed Ben Bernanke, who was after mentioning the term helicopter money instantly renamed to "Helicopter Ben" by the US media and the public.

The practical part of the thesis predicts average marginal propensity to consume the transfer received under the hypothetical policy of helicopter money in Czech Republic, as no similar research focused on the Czech setting was

published in the past. For this purpose, four years marked by the combination of inadvertently-low inflation and zero lower bound on two-week repo rate were chosen — 2010, 2011, 2015, 2016.

In order to obtain reliable predictions of MPC, meta-analytic approach is used. MPCs extracted from 26 studies are explained by a set of 18 country-level macroeconomic and cultural variables. While controlling for publication bias and performing variables selection through Least Absolute Shrinkage and Selection Operator (lasso) the model predicts average MPC ranging from 0.46 to 0.51 for the specified years.

Outline of possible further research

Presented results might be used to model the possible effects of helicopter money, which can be then compared to the policy CNB chose during 2010s — the exchange rate commitment.

How ever, despite trying to get the predictions as close to the reality as one can with macro data, I think the use of micro data, which are not yet available for the Czech Republic, makes more sense when explaining MPC. Fortunately, Czech Republic will be included in the new wave of Eurosystem Household Finance and Consumption Survey, which is currently being gathered.

Lastly, I think the topic of evaluating helicopter money in combination with forward guidance is interesting, as Agarwal & Qian (2014) reports significant announcement effect on the consumption, when the government of Singapore expressed its will to redistribute the dividends flowing to the treasury from invested reserves.

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Appendix A

Sources of MPC Estimates

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