Central Bank Independence, Happiness, and Plausible Transmission Channels

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Abstract: the rule or discretion debate about central bank independence is longstanding, arguing which policy can reach a better macroeconomic performance and a higher social welfare level. The modern mainstream believes an independent central bank can stabilize the price level, and therefore it should be insulated from its government. The opposite view indicates this may not hold true and argues a discretionary monetary policy can fulfil the similar purpose. Since the public policy theory assumes politicians' objective is to maximize their votes for next election, I suggest this argument can be considered from individual's perspective. Hence, I adopt happiness data to estimate the effect of central bank independence with ordered probit model, and to see how this institution can affect people via other plausible transmission channels. The empirical results show that the vulnerable groups of a society would like the government to intervene more. However, in the long run people still prefer the central bank to stabilize the macroeconomic performance. The lasting effects of central bank independence on the channels can further support this view.

I hereby declare and confirm that this thesis is entirely the result of my own work except where otherwise indicated. I acknowledge the supervision and guidance I have received from Professor Jerg Gutmann. This thesis is not used as part of any examination and has not yet been published.

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1. Introduction

Central bank policies differ widely across countries and time. Central banks that pursue discretionary monetary policies are characterized by acting dynamically to economic conditions. While this approach allows for accommodating short-term problems it has been pointed out that this strategy makes central bank policies dependent on the prevailing political environment which could harm the economy in the long-run (Kydland and Prescott,1977 and Barro and Gordon, 1983).

In contrast to discretionary monetary policies several central banks pursue rule-based monetary policies in which specific targets and goals (e.g. inflation and unemployment targets) are set a priori with the central bank acting only if certain a priori determined thresholds are passed. Since such rule-based approaches are relatively independent of actual political events in a country, there is more scope for the central bank in this case to achieve its long-term objectives. Clearly, it is easier for central banks to commit to a policy of rule-based monetary policies the more independent it is constitutionally (de jure and de facto).

Famous examples for rule-based central banks are the Japanese Central Bank and the German Central bank. For example, the Article 2 of the Bank of Japan Act says "Currency and monetary control by the Bank of Japan shall be aimed at achieving price stability,

thereby contributing to the sound development of the national economy."[1] Likewise and despite less relevance under the Euro, the article 3 of the Bundesbank Act of Germany also says "it shall participate in the performance of the ESCB's (namely, European System of Central Banks) tasks with the primary objective of maintaining price stability."[2]

While rule-based monetary policies for central banks are often propagated by economists, the view is not shared by everyone. For instance, the USA's Fed (Federal Reserve System) implements a discretionary monetary policy[3]. Likewise, it is not unanimously accepted that central bank independence (CBI) delivers the best welfare and economic outcomes. In their seminal paper Alesina and Summers (1993) show that "it is possible for nations to achieve these benefits (i.e. to avoid dynamic consistency inflation) without setting a monetary rule by insulating the central bank from political control."

The argument for more central bank independence (CBI) often rests on political economy arguments borrowed from the public choice theory. Politicians and policy makers maximize their own utility and therefore might adopt policies that will enable them to win the next election but that might harm the economy and welfare of a country

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[1] The article is from the website of the Bank of Japan:
http://www.japaneselawtranslation.go.jp/law/detail/?id=92&vm=02&re=01 (last visited on 10/08/19)
[2] The article is from the website of the Bundesbank of Germany:
https://www.bundesbank.de/resource/blob/618304/6d6986cbc43dff11cf78d56b2c29502b/mL/bundesbank-act-data.pdf (last visited on 10/08/19)
[3] The Section 2A of the Federal Reserve Act says the Fed "shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates." (see the website of the Federal Reserve of the USA:
https://www.federalreserve.gov/aboutthefed/section2a.htm, last visited on 10/08/19)

in the long-run (Buchanan and Tollison, 1984). In order to win elections politicians must affect the mood and preference of their electorates. Politicians might have the tendency to ask their central bank to implement monetary policies that are popular among the people. Assuming that the less independent a central bank is the more likely it is to accommodate the wishes of politicians. Therefore, I suggest this rule- or discretion-based monetary policy argument can be re-examined from individual's perspective, namely to know how CBI affects people's happiness.

In economics, the concept of utility is concerning people's feeling and has developed for long. However, the fact that utility should be derived from observability and objectivity is widely believed, but there was no convincing measure for this kind of data in empirical analysis. This at the same time limited the boundary to do various empirical studies. For last decades economists have started to introduce happiness data from psychology. Psychologists have demonstrated such a data can truly reflect how people feel. In other words, the usage of such a data helps expand the empirical economic research area. Also, regarding the reliability and credibility of such a data, many also believe there are a lot of works from psychologists proving the usefulness so that in economics the data can be used with ease. (e.g. Di Tella, MacCulloch, and Oswald, 2001, 2003; Castriota, 2006)

Easterlin (1974) is the first to use this kind of data to analyze the relationship between

GDP and people's happiness, and indicating that happiness level won't grow with GDP increasing, which is the so-called Easterlin paradox. The research encouraged more and more economists to adopt the data to analyze this interesting finding, and more importantly the models which have been established previously. For example, Researches studying unemployment and inflation use happiness data as a proxy variable for the concept of utility to estimate Phillips curves. Di Tella et al. (2001) estimate the effects of unemployment and inflation to calculate the marginal rate of substitution in Europe, and show that the two rates have the different weights when it comes to the Misery Index. Wolfers (2003) and Alesina, Di Tella, and MacCulloch (2004) also are devoted to studying the effects of unemployment and inflation in the US and Europe. Other perspectives like personal income level, social and political environment are also studied with happiness data to give more possible policy implications.

As for CBI, according to Bernhard (2002), it means a central bank's capability of controlling monetary policies. That is, if a central bank doesn't need to consider the influence of its government, it has the more independent level. In literature several indicators have been developed to measure CBI level. Bade and Parkin (1977) are the first to construct such a data. Since them, Grilli, Masciandaro, and Tabellini (1991), Cukierman, Miller, and Neyapti. (1992), and Alesona and Summers (1993) and so on also develop their own indicators, which cover different time periods and standards, to study

the relationship between CBI and price stability or unemployment mostly. In fact, the literature usually follows the method from Cukierman et al. (1992), because they provide a more comprehensive standard to construct the indicator, which contains four dimensions such as central bank governor's characteristics, policy formulation attributions, central bank's objectives, and central bank's limitations on lending.

There is a concern needed to be considered. The relationship between CBI and people's happiness may not be so direct. For common people, the existence of the central bank probably is too far away to really take this factor into consideration in decision making. That is, they might not really realize what the central bank does to their environment so the effect of CBI should also be transmitted via some other transmission channels. In fact, how CBI influences unemployment and inflation is also studied in the literature. Especially, more researches study the effect on inflation and a vast of them agrees the relationship should be negative (e.g. Grilli et al., 1991), while the findings for unemployment differ (e.g. Cukierman and Lippi, 1999; Radcliff, 2001; Bleaney, 1996). On the other hand, the influences of unemployment and inflation on people's happiness are negative (e.g. Alesina et al., 2004; Di Tella et al., 2001, 2003; Wolfers, 2003.), and it is widely believed that unemployment hurts more than inflation does to people.

Empirically examining the relationship between CBI and happiness was hampered in previous decades due the absence of adequate data on CBI and happiness. Recently the

extended coverage of the World Value Survey (WVS) allows to cover a large set of countries and time periods. Leveraging data from the WVS for the period 1991 to 2012 for 82 countries I examine whether CBI affects happiness controlling for country- and year fixed effects. My measure for CBI comes from a well-known study of Garriga (2016). My econometric specification follows Di Tella et al. (2001, 2003), leading me to adopt a multivariate regression approach estimating ordered probit models, and Papyrakis and Gerlagh (2004). I specify the models such that I am able to estimate the overall effect of CBI on happiness and the indirect effects via the plausible transmission channels (e.g. inflation and unemployment rates). To assess the sensitivity of my results to econometric specifications I run several robustness checks and extensions.

My empirical results suggest that CBI is negatively correlated with happiness. People become unhappier if the independence level of the central increases. It indicates that people dislike an independent central bank. Adopting the rule-based policy should be against their preference. The possible explanation for this is people like a big government. For politicians it's a crucial signal that people might favor the government devotes to improving the quality of their environment. This phenomenon especially applies to vulnerable groups such as the groups of younger generation, lower income level, and lower education level, while has no statistically significant effect on those who are older, have higher income level, and have higher education level. This seems to suggest that the

politicians can confidently interfere the central bank's decision making without facing conflicts since the results show the consistent negative or neutral effect on different groups.

However, as mentioned, the influence of CBI is expected to be long term. The robustness test results show that the effect lasts only very short. It turns out to become positive no matter what group these people are in and the influence can last as long as five years. The effect is insignificant only for the less educated group. It suggests in the long run people will still prefer a more independent central bank or a more stable economic environment, which lead to a dilemma faced by the government that if it should sacrifice long term economic stability for the short run election winning.

This view can be further supported by the results from the analysis of transmission channels. The effects of CBI on unemployment and inflation are positive and negative respectively and the size of the latter is stronger than the former. The effects also can last after I use lag terms of CBI to re-run the regressions, proving even though it's indirect, CBI can effectively and constantly influence the two plausible channels. One thing is noteworthy here. These channels might not work out under every possible environment. For example, in lower developing countries CBI has effect only on unemployment but inflation. On the other hand, it influences only on inflation in more advanced developing countries.

As far as I can know, this thesis will be the first one to study the effect of institution, CBI, on people's happiness level. I use the latest updated data to estimate the results for relatively large country sample and observations. Also, the literature usually splits samples into different inflation or GDP level groups. I instead try to look into the effect from individual's perspective and find out there exists difference between subgroups. However, the split standards here might not be delicate enough. For example, I use the mean age to differentiate the observations. The standard to split more than two groups can be considered. Similarly, mean GDP level to separate countries can also be reviewed for its appropriateness. For the relevant studies in the future, they can try to adopt more strict standards when looking into these effects from CBI and plausible transmission channels.

The rest of the thesis is organized as followed. I will review the literature about CBI, happiness economics, and the plausible transmission channels of central bank in section 2. Section 3 describes the data from the WVS, Garriga (2016), and the World Bank. Then I will discuss the model specifications and the applied empirical strategies in section 4. The empirical results will be presented and discussed in section 5, and the thesis concludes in section 6.

2. Literature review

For this thesis, there are three main parts, including CBI, happiness data applied in economics, and the plausible transmission channels. In this section, therefore, I will review the three parts more detailed respectively.

2.1 CBI and its indicators

CBI considers a central bank's capability of controlling monetary policies (Bernhard, 2002). Hence, the question about how much capability the central bank should enjoy becomes of interest. In literature, there's the argument about "rule versus discretion" of central banks. If a central bank adopts the rule-based policy, it should stick to the goal it sets beforehand however the macroeconomic circumstances change, while if the discretion-based policy is adopted, the central bank should vary its goal based on the macroeconomic performance of the economy, which implies that politicians can more easily influence the central bank's decision about the price level in order to reach their objectives. Barro and Gordon (1983) indicated, however, the discretionary method could only make a temporary shock to economic actors due to the time inconsistency problem. In the long run, the actors will adjust their inflation expectation resulting in increasing inflation without other positive effects on the economy, especially on unemployment. In other words, this discretion can only cause political business cycle. Since then, the belief that a central bank should be an

independent institutional device to stabilize price level has become the mainstream, and many countries followed this rule-based policy to design the function and capability of their central bank.

Hence, the relationship between CBI and price level stability becomes an empirical study issue for many economists. Lots of literature started to construct its own CBI indicators to demonstrate this hypothesis. There are a few indicators cited and expanded more frequently, including Bade and Parkin (1977), Grilli et al. (1991), Cukierman et al. (1992), and Alesona and Summers (1993) and so on. These indicators cover different time periods, countries, and legal regulations about central banks and their governors. For example, Bade and Parkin (1977) is the first to construct a CBI indicator (Laurens, Arnone and Segalotto, 2009). The indicator contains 12 industrial countries between 1951 to 1975, and is constructed based on the legal provisions regarding the central bank's objective (Laurens et al. 2009). Likewise, the indicator from Grilli et al. (1991) contains 18 OECD countries during the period from 1950 to 1989 based on two kinds of independence, including political and economic ones.

As far as I know, Cukierman et al. (1992) is one of the most widely used indicators in literature. One of the main contributions is they consider the gap between de jure and de facto independence and develop more comprehensive indicators to study

further relevant topics. Before them, the developed CBI indictors usually only considered de jure independence. Based on the thinking that industrial and developed countries have higher level of rule of law, focusing on de jure independence might be acceptable when the research only studies these countries. However, for some developing countries, the extent of rule of law might be limited so that constructing an indicator based on its de facto independence for those countries will be more suitable. Particularly, Cukierman et al. (1992) argue indicators based only on law itself have two problems: "First, the laws are incomplete in that they cannot specify explicitly the limits of authority between the central bank and the political authorities under all contingencies […] Second, even when the law is quite explicit, actual practice may deviate from it."

Therefore, they suggest the de facto CBI indicator can be collected from either the questionnaire answered by experts or calculating the turnover rate of central bank governor, and developing four indices for 72 countries (21 industrial countries and 51 developing countries) from 1950 to 1989, including legal independence, the turnover rate of central bank governors, the aggregation of the previous two, and responses of specialists to a questionnaire (this indicator only from 23 countries). For the indicator measuring legal independence, it contains four dimensions, including central bank governors (appointment, dismissal, and term of office etc.), policy formulation, its

objectives, and the limitation on lending to the government. Similarly, the indicator

from the questionnaire also includes the variables of legal independence indicator, as

well as the opinions of specialists on CBI of their own country, trying to overcome

the gap between de jure and de facto independence. In other words, they develop

several indicators capturing more broadly different aspects of CBI. Due to the

comprehensiveness, the method is adopted very often.

However, these de facto independence indicators have some disadvantages. This

kind of indicator is difficult to collect. Conducting a questionnaire in many countries

is time and finance consuming, resulting in the limited coverage. Lack of variation

causes the doubt in its reliability. Garriga (2016) points out that in terms of indicators

based on questionnaires, de facto indicators are less reliable "because of their narrow

coverage, their problematic cross-sectional comparability, and their little within-

country variation." Similarly, the governor turnover rate may have the endogeneity

problem. The higher turnover rate cannot guarantee the lower CBI. Cukierman et al.

(1992) admit that even though intuitively speaking the higher the turnover rate is the

less independent a central bank is, it may not always be the case in reality. A governor

may be obedient to its government so that the turnover rate is low. The low rate exactly

reflects its high dependence. Therefore, in literature more still prefer the legal

independence to do empirical analysis due to the comprehensiveness in terms of

countries and time (Garriga, 2016), and they usually follow the method of Cukierman et al. (1992) to construct newer indicators.

2.2 Happiness in economics

Economists always concern individuals' choices and developed the concept of utility, representing one's satisfaction/happiness level, while in real world utility is unobservable. Samuelson (1938) proposes the revealed preference theory, which explains that given the assumptions that people are rational and they will maximize the utility, their true utility function can be derived by observing their choices. By the theory, economists construct the concepts including indifference curve, producer/consumer surplus and to get the optimal equilibriums of markets.

However, although the concept of utility is so widely used, the constructed models derived from utility are still very difficult to do empirical analysis. For example, Di Tella and MacCulloch (2006) mention it is commonly known that if a government levies a higher tax on cigarettes, the demand for cigarettes will decrease, but it's hard to know if smokers will increase their utility due to the policy. There are two opposite explanations for the possible utility changes. The dispute, however, cannot be solved until happiness data is adopted to study further.

The example points out the first difficulty when economists use utility. As Loewenstein and Ubel (2008) have mentioned, utility is ordinal data. The real value

doesn't mean anything meaningful and cannot be compared between different individuals. The only thing known from the value of each individual is the larger the number the happier each individual is, which means it's hard to compare every individual's utility level to do cost and benefit analysis for each policy. Therefore, when it comes to efficiency in economics, more consensuses can be reached, but not in the issues about equality like the example of cigarettes.

The second difficulty is the assumption that people is all rational may not always be true. Loewenstein and Ubel (2008) indicate people will make wrong predictions and feel regretful. Frey and Stutzer (2003) also say the assumption has been demonstrated too naïve by psychologists. Therefore, if economists derive the models by the concept of utility under this assumption, the availability might be questioned. Also, from revealed preference theory what are observable, such as individuals' choices and decisions, are the only thing one can trust. Except for what observable, other factors won't be taken into consideration in terms of research. Sen (1986) thinks there are obsessive concerns with observability such that economists ignore those unobservable, which also heavily influence one's utility like self-esteem and emotion.

The term "happiness" in economics is also called satisfaction, subjective well-being (SWB), reported happiness, and experienced utility. The data is acquired from questionnaires which ask several questions about how one feels, like in the

questionnaire of the World Value Survey for the wave 6 survey: "Taking all things together, would you say you are very happy, rather happy, not very happy, or not at all happy? "[4] That is, happiness data is not confined to the observability anymore. It collects the direct and self-assessed answers from individuals and that is why some call it subjective well-being.

Therefore, happiness data overcomes the three mentioned shortcomings of utility. First of all, happiness data is acquired subjectively from individuals rather than from observing objectively. By the subjectivity, economists can concern less about the assumption of rationality. Even if individuals are irrational, at least the answers can reflect how they really feel (and this is sometimes what matters more). One may doubt the reliability and validity of the questionnaires. Di Tella et al. (2001) consider economists don't need to concern it because psychologists have been devoted so much researches to demonstrating the data truly satisfy the criteria. Castriota (2006) say it means happiness studies have "survived a cultural Darwinian selection in psychology and sociology." Di Tella and MacCulloch (2006) also say even there are few people who are so irrational that the efficiency of the data is seriously influenced, if the sample size is large enough, the doubt is still unnecessary. Second, because happiness data is not confined to observability, economists can study more issues which are not

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[4] The question is from the questionnaire of the Wave 6. See
http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp (last visited on 10/08/19)

discussed empirically before such as institution, emotions, self-esteem, environment, and education etc. For example, Frey and Stutzer (2000) study the influence of direct democracy in Switzerland. Castriota (2006) indicates happiness economics integrates the different social science perspectives. Mota (2007) further point out these fields includes psychology, sociology and neuroscience. Finally, probably the most powerful advantage of happiness data is it can be conducted in empirical researches. Like the cases of cigarette and direct democracy, the relevant derived models can be testified to confirm whether the predictions are true or not in real world. Economists use happiness data as a complementary tool for the traditional concept of utility and this is the most appreciable part of the data.

However, not all happiness data collected will meet the criteria. Here I roughly divide the happiness data into two kinds: aggregate-level and individual-level happiness data. The aggregate-level happiness data is like gross national happiness (GNH) and OECD's Your Better Life Index. GNH is proposed by Bhutan. Traditionally, GDP measures the performance of an economy, while it only cares about market values. Hence, GNH emphasizes more on the quality of life and it has rather different indicators to measure the whole country's happiness. In other words, it regards all people living in Bhutan as a whole. Only can we know from GNH is how happy the country, rather than an individual, is. Your Better Life Index is the

similar indicator. The index, which was first investigated in 2011, is surveyed every year by OECD. It provides key ingredients to judge if the countries improve their life. According to OECD[5], it finds a better way to measure people's lives influenced by other areas beyond GDP. The areas include education, environment, healthcare, community, and jobs etc. Every country in the survey will get a comparable score every year. If the score is higher than the one of the last year or other countries, it means the country has a better life. This kind of happiness data, as far as I know, still has not been adopted in researches. It is probably because the data is not subjective enough. It cannot meet the expectations for what happiness data should satisfy. Another possible reason is that there is still no large enough sample size for studying.

In contrast, individual-level happiness data is usually of interest and adopted in relevant researches. In literature the data usually is collected from Euro-Barometer Survey (EBS, for Europe), General Social Survey (GSS, for the US), World Value Survey (for countries around the world), and Gallop poll etc. They ask interviewees how happy or how satisfied they are in terms of the environment they live. Usually, the answers will be coded ordinally and also are discrete.

In recent decades, economists introduced happiness from psychology into economics. Richard Easterlin (1974) is the first scholar in economics to "make a

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[5] OECD (2017), How's Life? 2017: Measuring Well-being, OECD Publishing.

prominent use of happiness data." (Di Tella and MacCulloch, 2006) He indicate that

for individuals the more income the happier. That is, the relationship between income

and happiness is positive. While when it comes to a country as a whole, the positive

relationship disappears. With GDP growing, the happiness levels of countries remain

the same. The phenomenon is called Easterlin paradox in literature. Di Tella and

MacCulloch (2006) summarize the explanations to the paradox. The possible reasons

for observing this paradox are: if happiness data is related the true utility? If happiness

data can be compared? If there are omitted variables? The paper has provided

evidences (e.g. Winkelmann and Winkelmann, 1998; Kohler, Behrman and Skytthe,

2005; Di Tella and MacCulloch, 2008) to prove the explanations are invalid. Until

now, the more persuasive explanations to the paradox are relative income and

adaptation effect. Luttmer (2004) studies a panel of almost 9,000 individuals in the

United States and observes only relative income can affect one's happiness instead of

absolute income. Easterlin (2005) has shown that the evidences suggest a complete

adaptation effect, which means people adjust their desires. The effect of an incident

will perish over time. Despite of the studies, there are still arguments about whether

the paradox exists. Stevenson and Wolfers (2013) point out the paradox indicates

when income reaches a specific level, it will hardly influence happiness level anymore.

Therefore, they try to find the threshold value. If happiness level becomes still when

income reaches the value, then the paradox exists, or it doesn't. The results proved that the positive relationship between income and happiness still remain. At least in real world there is no country having reached the threshold value yet.

In addition, economists have more interests in other issues since Easterlin (1974). Wolfers (2003) indicates previous studies have no consensus on the influence of business cycle. He uses happiness data to study and showing the instability of macroeconomic conditions, especially unemployment, deteriorates people's happiness. Frey and Stutzer (2000) find out institutions, namely direct democracy here, can increase the happiness level. They even distinguish people living in Switzerland from those who being there just for sightseeing. By the sample decomposition, the empirical results indicate only those living in Switzerland increase their happiness level. In other words, direct democracy has positive influence on only those who really benefit from it. Diener, Diener and Diener (1995) study the relationship between human rights and happiness; Castriota (2006) and Layte Nordenmark, and Strandh (2006) connected happiness data with education and unemployment benefit system.

In fact, Dolan, Peasgood, and White (2008) have summarized the related topics of previous researches. It includes income, personal characteristics (e.g. age, gender, ethnicity, and personality), socially developed characteristics (e.g. education, health,

unemployment), how we spend our time (e.g. hours worked, volunteering, caring for others, exercise), attitudes & beliefs towards self/others/life (e.g. trust, religion), relationships (e.g. marriage, having children, seeing family and friends), and wider economic, social and political environment (e.g. income inequality, unemployment rate, inflation rate, degree of democracy, urbanization). The effects of unemployment and inflation rates will be provided more details later.

Happiness data from surveys usually has two alternative choices: happiness and life satisfaction. Also, there are contrary views about the two alternatives. One considers the two are interchangeable (e.g. Blanchflower and Oswald, 2004; Di Tella et al., 2001), while the other (e.g. Stevenson and Wolfers, 2008) considers the two are different and cannot be mixed up. In the thesis, I don't analyse the similarities and differences of the two, so I will only use happiness data rather than life satisfaction to avoid the argument.

Endogeneity is an important concern of running the happiness regression. The endogeneity problem can come from various sources, including unemployment, inflation, personal income, employment status, education, and so on. Most of literature discusses whether there is endogeneity in employment status. Winkelmann and Winkelmann (1998) suppose endogeneity will happen in the sample of younger workers. If the assumption is correct, then splitting the sample into younger and older

workers, the results will differ. However, the empirical results don't support the assumption, proving there is no endogeneity. Warr, Jackson, and Banks (1988) collect the previous researches using General Health Questionnaire (GHQ, designed for measuring psychological health and pressure) data of individuals who was in school, and prove that GHQ has no influence on their post-graduation employment status. Moreover, if GHQ decreases after graduation, it must result from the change of employment status. The results also demonstrate happiness level won't affect the status. Knabe and Ratzel (2011) use panel data and controll fixed effects to confirm endogeniety doesn't exist. Even some might insist the problem exists. Unfortunately, Di Tella et al. (2003) mentioned "it is not straightforward to find believable macroeconomic instruments that can identify the well-being equations (meaning happiness regressions)." Also, persuasive instrument variables for microeconomic variables can hardly be found. Hence, I will ignore this problem here.

2.3 Transmission channels of CBI and their effects on happiness

For individuals, CBI maybe is a more abstract idea. Normally people don't react directly according to that of their country but other macroeconomic factors instead, meaning people don't really take this factor into account when making decisions. Therefore, CBI may influence people's happiness via some other transmission channels. Here I will discuss inflation rate and unemployment rate as the possible

channels.

To maintain the price level usually is the main objective of a central bank following the argument of Kydland and Prescott (1977) and Barro and Gordon (1983). A vast literature demonstrates and supports this suggestion proving the relationship between CBI and inflation rate is significantly negative (e.g. Bade and Parkin, 1982; Grilli et al., 1991). It means if a central bank can be insulated from its government it can effectively avoid the interference from the executive department and decrease the possibility of political business cycles. Moreover, Alesina and Summers (1993) indicate the level of price stability is also promoted.

However, the doubts about the usefulness of those indicators and the causality of CBI and inflation rate also arise. Some question that if the indicators cannot truly reflect the real level of independence the empirical results should be questioned; or even though the negative relationship does exist, it doesn't necessarily prove it's influenced by the independence. The first doubt is based on the different criteria and interpretation for law used to compile the indicators. Berger, de Haan, and Eijffinger (2001) explain the problem may come from "[T]he choice of the criteria is quite crucial and most indicators have been criticized in this regard." As for the second doubt, they also indicate Posen (1995) argues it's actually a spurious relationship. "The strength of the opposition of the financial sector against both determines the

degree of CBI and the level of inflation." Posen (1998) studies 17 OECD countries

from 1950 to 1989 and finds out even though there is the negative relationship it's

not achieved by the commitment to stabilize the price level. Nevertheless, Berger et

al. (2001) summarize that Eijffinger, van Rooij, and Schaling (1996) use various

indicators to re-examine the negative relationship it is still confirmed. Also, Posen's

argument can't be supported by many other empirical analyses.

As mentioned above, there might exist the gap between de jure and de facto

independence. Cukierman (1994) finds out the negative relationship can only be

observed in industrial countries using de jure independence, while the effect

disappeared using de facto independence indicator. In contrast, in developing

countries inflation is only related to de facto rather than de jure independence. De

Haan and Kooi (2000) have the similar conclusion. They show there is a significant

relationship between the turnover rate of central bank governors and inflation rate

based on the analysis on 82 developing countries across the period between 1980 and

1989. Crown and Meade (2008) also develop their own indicator based on

Cukierman's criteria. After controlling the country fixed effect and the possible

endogeneity problem, they still have the same conclusion.

There is relatively less discussion in literature about the relationship between CBI

and unemployment rate compared to that of inflation, and also less consensus on the

effect of CBI on unemployment rate. In consideration of the difference of de jure and de facto independence, Cukierman and Lippi (1999) use the legal independence from 19 OECD countries only at three time points (1980, 1990, and 1994) to show there's a positive relationship between unemployment and CBI and in particular when the centralization of wage bargaining power of labour unions is low. Hall and Franzese (1998) and Guzzo and Velasco (1999) share the same view. This finding supports the short-term negative effect between inflation and unemployment. That is, the short run negative Phillips curve exists. If a central bank aims to lower the inflation, the unemployment will increase accordingly. However, a negative relationship is found by Radcliff (2001), and Bleaney (1996) doesn't find there exist any effect even though using the similar data as in Hall and Franzese (1998).

As for the effects of inflation and unemployment on individual happiness, unemployment has been found to decrease happiness level in the US (Alesina et al., 2004) and in Europe (Di Tella et al., 2001, 2003; Wolfers, 2003). Inflation has the similar influence (Alesina et al., 2004; Di Tella et al., 2001, 2003; Wolfers, 2003). Di Tella et al. (2001) aim to ensure that unemployment and inflation have influences on people's happiness level. Their data source is the Eurobarometer Survey, which has 264,710 people living in 12 European countries over the period 1975 to 1991. However, they use life satisfaction instead of happiness because life satisfaction data

is available for a longer period. After controlling the personal characteristics, the estimated coefficients of the two rates are -2.8 and -1.2 respectively, reflecting unemployment hurts more. Thy indicate the tradeoff should be 1.66 in Europe. In literature the range can be between 1.6 to 5 (Dolan et al., 2008), meaning unemployment is always more unfavourable than inflation from people's perspective.

Di Tella et al. (2003) basically follow the model specification and techniques from Di Tella et al. (2001), and focusing on the similar sample. They try to know in empirical how people are influenced by macroeconomic fluctuations resulting from GDP, unemployment and inflation, and it turns out that macroeconomic movements have strong effects on happiness level. Besides the conclusion, the empirical strategies are noteworthy. First of all, they use the same model specifications in terms of personal characteristics compared to Di Tella et al. (2001). In fact, the literature also has the similar specifications, such as Clark and Oswald (1994) and Castriota (2006). Secondly, they claim happiness data is useful, and arguing other fields of social science have used it for long. There are so many studies in psychology proving the data is efficient and valid. In addition, the empirical results acquired from using happiness data show highly consistency among different countries.

3. Data and descriptive statistics

In the thesis the happiness data and other personal characteristics will be collected from the World Value Survey, the CBI indicator from Garriga (2016), and macroeconomic variables such as unemployment, inflation and GDP are from the World Bank. Unemployment rate is measured by percentage of total labour force. Because there is not every country having data for each year, I instead use the data estimated by the ILO since 1991. Inflation rate shows the rate of price change in the economy as a whole. As for GDP, I use GDP per capita measured by constant local currency unit to avoid the influence of inflation. When running regressions, I use log GDP. The more detailed information about the happiness and CBI indicator data is as followed.

3-1. Happiness level

The source of happiness data is the World Value Survey, which is "a global network of social scientists studying changing values and their impact on social and political life" since 1981[6]. The advantages of this data are it has more countries surveyed and covers longer time period. Until now there are already 6 waves available and I will take wave 2 to wave 6 into consideration[7]. The wave 2 to 6 were surveyed in 1990-

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[6] The website of the World Value Survey: http://www.worldvaluessurvey.org/WVSContents.jsp (last visited on 10/08/19)

[7] The unemployment data from the World Bank (modelled ILO estimate) is only available since 1991, while the wave 1 of the World Value Survey is surveyed between 1981-1984. In consideration of data availability, I drop the wave 1.

1994, 1995-1998, 1999-2004, 2005-2009 and 2010-2014, respectively. Each country

was surveyed in a particular year in each wave time interval. At least 1,200 people

were surveyed in each wave for each country. In the thesis the data from 82 countries

will be used (see Appendix 1).

The question about happiness in the questionnaire is "Taking all things together,

would you say you are very happy, rather happy, not very happy, or not at all happy?

The answers 1 to 4 represent "very happy", "rather happy", "not very happy", and

"not at all happy."[8] The smaller the number the happier but it's rather counter-

intuitive. Therefore, I recode the numbers, letting the larger number represents the

higher happiness level.

The basic descriptive statistics of the happiness level is shown in the Table 1. Most

people scored their own happiness level 3, and the mean and standard deviation are

3.06 and 0.76. Figure 1 shows the distribution of the world happiness level is skewed

to left, meaning most of people (80.77%) think they are happy.

Table 1: Happiness Level

	Mean	S.D.	Mode	Median
Happiness Level	3.06	0.76	3	3
Scores	1	2	3	4
Percentages of Happiness Level	3.1%	16.09%	51.96%	28.81%

Note: 1. Data source: World Value Survey. 2. Happiness level: The scores 1-4 represent "very happy", "rather happy", "not very happy", and "not at all happy." 3. Percentages of happiness level represent the number of observations for each score divided by the total observations.

Figure 1

Note: 1. Data source: World Value Survey. 2. Happiness level: The scores 1-4 represent "very happy", "rather happy", "not very happy", and "not at all happy." 3. Percentages of happiness level represent the number of observations for each score divided by the total observations.
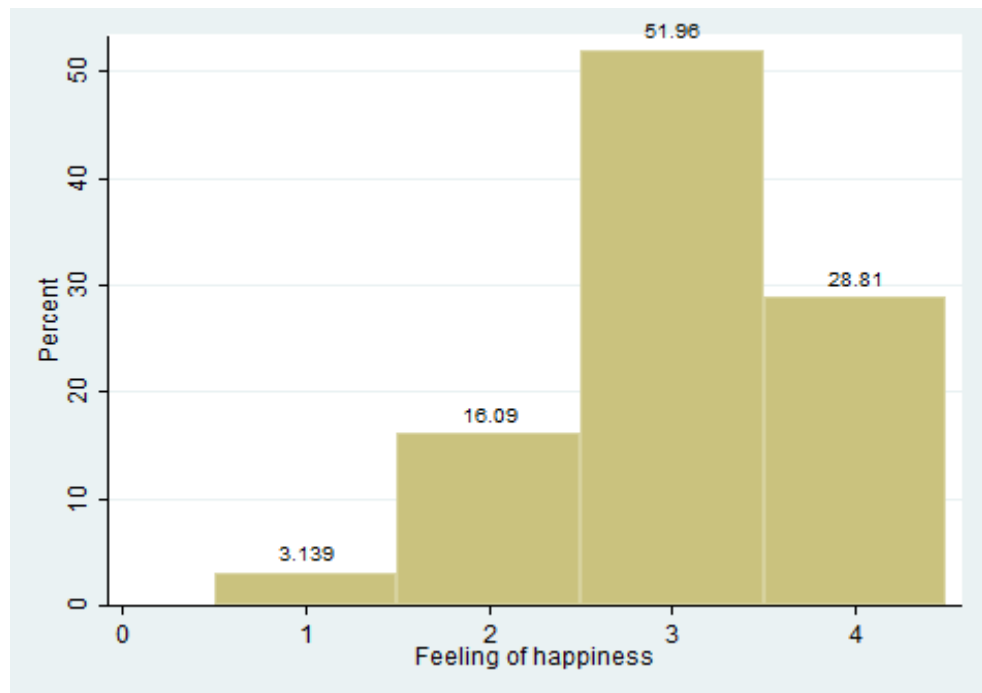
3-2. CBI level

A lot of CBI indicators have been established since Bade and Parkin (1977), and in

this thesis the indicator from Garriga (2016) is adopted. The indicator is a number

ranging continuously from 0 to 1 (very dependent to very independent) for each

country in every year, and covers 182 countries[9] in the time period from 1970 to

2012 based on the compiling standard rules from Cukierman (1992) and Cukierman

et al. (1992).

Particularly, there are "16 dimensions related to four components of CBI, on a

country-year basis." (Garriga, 2016), and the four components include central bank

governor's characteristics, policy formulation attributions, central bank's objectives,

and central bank's limitations on lending to the public sector (the specific standards

see Appendix 2).

I choose this indicator due to several advantages. First of all, it follows the coding

standard from Cukierman (1992) and Cukierman et al. (1992), which covers many

perspectives of CBI. That is, it's rather comprehensive to avoid the argument of

coverage as much as possible. Also, the standard is very clear and easy to replicate

so that the reliability of it is guaranteed. As far as my knowledge, the more recent

literature concerning CBI also relies on the same standard. Therefore, the more

outstanding feature of this indicator is that it covers the most countries and very up

to date (until 2012).

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[9] Due to data availability, I only use 82 countries in my dataset.

The mean and standard deviation values of the CBI indicator are 0.58 and 0.22, and

the width of the indicator is large (the minimum is 0.1345 while the maximum is

0.979). However, the distribution looks relatively even from the figure 2. The data is

slightly skewed to the left. On average the CBI level of a country is rather moderate.

Table 2: CBI Level

Mean	S.D.	Min	Max
0.57	0.21	0.1345	0.979

Note: 1. data source: Garriga (2016) 2. The CBI level is a number
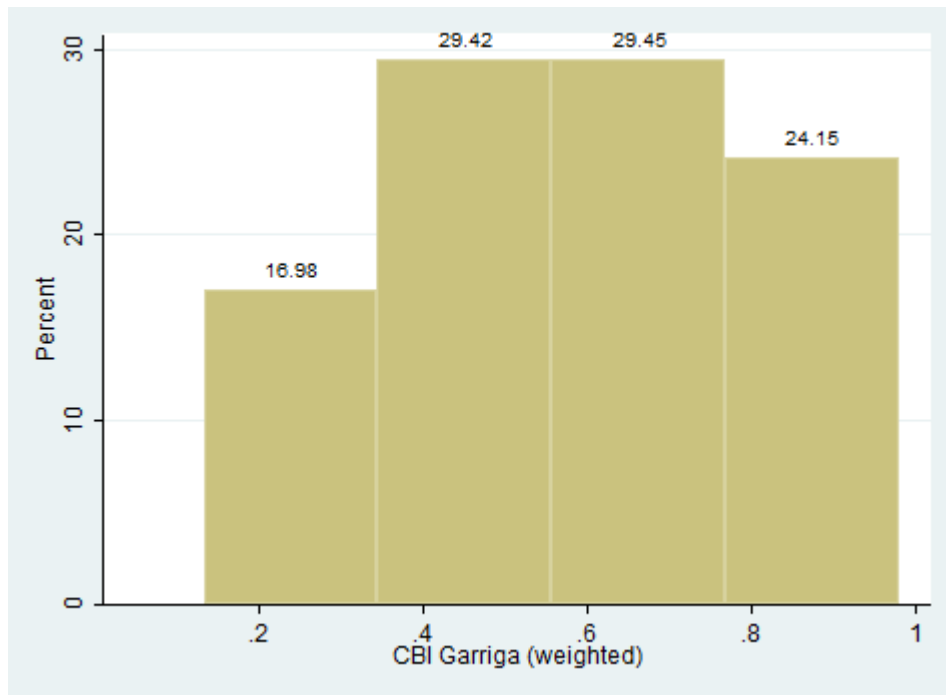ranging continuously from 0 to 1.

Figure 2

Note: 1. data source: Garriga (2016) 2. CBI Garriga means the CBI level, which is a
number ranging continuously from 0 to 1.

4. Model specification and empirical strategy

In the thesis the models from Di Tella et al. (2001, 2003) and Papyrakis and Gerlagh (2004) will be adopted to estimate the happiness regression and the transmission channels. Due to the nature of the individuals' reported happiness level, I estimate the happiness regressions with ordered probit model[10] (e.g. Clark and Oswald, 1994; Di Tella et al. 2001, 2003; Castriota, 2006). Here the regression is as following:

$$Happiness_{ijt} = \alpha_0 + \alpha_1 u_{jt} + \alpha_2 \pi_{jt} + \alpha_3 CBI_{jt} + \alpha_4 GDP_{jt} + \sum Personal_{ijt} + \theta_{1j}$$

$$+ \lambda_{1_t} + \varepsilon_{1ijt} \quad (1)$$

where $Happiness_{ijt}$ is the happiness level reported by individual i living in country j in year t. Macro variables include CBI, unemployment rate u, inflation rate π, and GDP for each country in the WVS surveyed years (e.g. Di Tella et al. 2001, 2003). θ, λ and ε are country fixed effect, year fixed effect and error term, respectively.

As far as I know, there's no research studying the influence of CBI on individual happiness level before. Therefore, the effect is uncertain. Intuitively speaking, the higher the CBI is, the more stable the economic environment. Hence, CBI will increase the

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[10] Because the happiness regression is estimated by ordered probit model, the estimated values have no any intuitive meaning except for the signs. Instead, the average marginal effects can be reported first. Then the changes of the proportion in the top happiness can be calculated. Here, I take the example in Di Tella et al. (2003) to explain the formula. In the estimated happiness regressions, there are three cut points because there are four categories for happiness level, which are called the points a, b and c from lowest to highest. If a person's happiness level is $H = X\beta + \epsilon > c$ (X is a vector of all independent variables), then the probability of being very happy for him/her will be $prob(very\ happy) = F(H - c)$, where $F(\cdot)$is standard cumulative normal distribution. Therefore, a change in an independent variable will lead to a change in one's happiness level ΔH and the change of probability claiming himself/herself "very happy" will go up to $\Delta prob(very\ happy) = F(H + \Delta H - c) - F(H - c)$.

happiness level via the transmission channels. On the other hand, an independent bank sometimes may be mistakenly understood to be incompetent so that happiness level will decrease with CBI going up. Besides, Di Tella et al. (2001, 2003) has estimated the influences of u and π are both negative, and the tradeoff (α_1/α_2) is about 1.66, meaning u hurts more than π. However, the size of the tradeoff is indefinite. Dolan et al. (2008) mentioned it can range from 1.6 to 5. As for the effect of GDP, the direction and significance are uncertain. GDP is insignificant according to Easterlin paradox. Many researchers also have the same conclusion (e.g. Di Tella and MacCulloch, 2008). Stevenson and Wolfers (2013), however, consider there is no such a paradox. The higher GDP still indicates people are happier.

Besides the effects of the macro variables of interest, I also follow the literature and control the personal characteristics ($\sum Personal$) so as to get the precise effects of what of concern. Di Tella et al. (2001, 2003) include marital status, employment status, gender, age, education level, income quartile and number of children in the happiness regressions. Other researches such as Frey and Stutzer (2000) and Castriota (2006) also have the almost similar specifications. As such, considering literature and the data availability, I take the marital status (a dummy variable, married=1, otherwise=0), employment status (a dummy variable, unemployed=1, otherwise=0), income level (ten income levels), age, number of children, education (a dummy variable, higher education=3, middle

education=2, lower education=1, otherwise=0) and gender (a dummy variable, female=1, otherwise=0) as the personal characteristic control variables. Also, the country- and year-specific time trend are included (e.g. Di Tella et al., 2001, 2003; Clark and Oswald, 1994).

Dolan et al. (2008) have summarized the signs of the personal characteristics. If someone is alone in marital status (such as single, divorced), he/she will be unhappier (compared to being married). Being unemployed is unhappier compared to other employment statuses, and the effect is usually much larger than other personal characteristics as reported in Clark and Oswald (1994). Income level, whose effect is more certain than GDP, has positive influence on individual happiness level. Age in literature has negative effect, while the square term is positive. That is there is U-shaped effect. The lowest point of happiness level occurs between 32 to 50 years old, meaning the middle-aged are the unhappiest; education has uncertain influence. Some studies (e.g. Blanchflower and Oswald, 2004) show the higher-educated are happier, while others (e.g. Stutzer, 2004) find that the middle-educated reach the happiest point. Even more, there are studies (e.g. Flouri, 2004) say no any relationship between education and happiness. Finally, gender also has indefinite influence. Some studies report no gender difference (e.g. Louis and Zhao, 2002). Still, some (e.g. Alesina et al. 2004) say women are happier.

Moreover, to find out the possible effects of transmission channels, Papyrakis and Gerlagh (2004) provide the statistical method, and I will follow the method to estimate

the relevant effects as followed:

$$u_{ijt} \text{ or } \pi_{ijt} = \beta_0 + \beta_1 CBI_{jt} + \theta_{2j} + \lambda_{2t} + \varepsilon_{2ijt} \quad (2)$$

In this thesis, I will first run the happiness regression model with the all observations, including all macro and micro variables. In consideration of the effects of transmission channels, I will also regress unemployment and inflation respectively on CBI to see the indirect effect of CBI on people's happiness level. The effects are shown from Eq.(3) (for unemployment) and Eq.(4) (for inflation), which are calculated via plugging Eq.(2) into Eq.(1).

$$Happiness_{ijt} = \alpha_0 + \alpha_1 \beta_0 + \alpha_2 \pi_{jt} + (\alpha_3 + \alpha_1 \beta_1) CBI_{jt} + \alpha_4 GDP_{jt}$$

$$+ \sum Personal_{ijt} + \delta \quad (3)$$

$$Happiness_{ijt} = \alpha_0 + \alpha_1 \beta_0 + \alpha_1 u_{jt} + (\alpha_3 + \alpha_2 \beta_1) CBI_{jt} + \alpha_4 GDP_{jt}$$

$$+ \sum Personal_{ijt} + \delta \quad (4)$$

where δ is the sum of all fixed effects and error terms, and the two terms of the estimated coefficient for CBI will be direct and indirect effects of CBI on happiness respectively.

Next, I'll split the sample to different groups based on their personal characteristics. In literature the more common case studies are splitting countries into high/low inflation or developed/developing countries. Since in the thesis the more personal variable (happiness data) is adopted, it should be more interesting and reasonable to split the sample via the personal features such as age, income level, employment status and

education level to shed some lights on possible policy implication.

Finally, to test if the results are consistent. There are three possible ways to do the robustness test, including adopting another CBI indicator, using a de facto CBI indicator, and using lag terms of CBI. However, the first two are less convincing and less applicable. As mentioned, the CBI indicator compiling method designed by Cukierman et al. (1992) is so widely used that more updated CBI indicators usually follow the method, which means theoretically speaking all these newer indicators are the same except for time periods and countries covered. Therefore, in terms of time availability, the indicator from Garriga (2016) should be the better one at this time being to the best of my knowledge. In addition, due to data availability, using a de facto indicator is more difficult. There are no questionnaires broadly conducted, or no enough turnover rate of central bank governor from many countries calculated either. Considering CBI may influence people through longer time period, I will use five different lag terms (from one-year lag to five-year lag) of CBI to replace the current CBI variable to run the previous mentioned regressions again, and to see if any further implication can be observed.

5. Empirical results

I first run the regressions to see the influence of the fixed effects without adding any transmission channels variable. The CBI variable keeps its significance except for the column (3) in the Table 3 when only the country fixed effect being considered. The influence on GDP is more unstable. It's positively significant in the column (1), (2) and (3), while being negative when only the year fixed effect controlled. As for the personal trait variables, the sign and significance are relatively stable.

	Table 3			
	(1)	(2)	(3)	(4)
VARIABLES	happiness	happiness	happiness	happiness
CBI	-0.321***	-0.437***	0.0132	-0.0972***
	(0.0112)	(0.0119)	(0.0320)	(0.0352)
GDP	0.00864***	-0.00314***	0.345***	0.113***
	(0.000959)	(0.00103)	(0.0132)	(0.0234)
age	-0.00675***	-0.00729***	-0.00646***	-0.00661***
	(0.000174)	(0.000178)	(0.000193)	(0.000193)
female	0.0291***	0.0294***	0.0500***	0.0491***
	(0.00482)	(0.00484)	(0.00492)	(0.00492)
married	0.0881***	0.107***	0.229***	0.232***
	(0.00543)	(0.00548)	(0.00575)	(0.00576)
income	0.0765***	0.0684***	0.0704***	0.0708***
	(0.00113)	(0.00114)	(0.00121)	(0.00122)
unemployed	-0.163***	-0.162***	-0.158***	-0.161***
	(0.00885)	(0.00887)	(0.00921)	(0.00923)
children	0.0275***	0.0278***	0.000747	0.000446
	(0.00176)	(0.00178)	(0.00189)	(0.00189)
education	0.0228***	0.0244***	0.0346***	0.0331***
	(0.00303)	(0.00311)	(0.00330)	(0.00332)
Country	No	No	Yes	Yes
Year	No	Yes	No	Yes
Observations	211,970	211,970	211,970	211,970

Next, I pool all observations together to estimate the effect of CBI on personal's happiness level with or without the transmission channels variables, and control with GDP, personal characteristics variables (marital status, employment status, age, gender, income level, education level, and the number of children) and fixed effects (country and year) suggested by literature (e.g. Di Tell et al, 2001, 2003), and report the results in the Table 4.

I first focus on the effect of CBI on happiness. From the column (4) of the Table 4, CBI still remains the significance when the transmission channels included in the model and the size barely changes, compared to the column (1) to (3). Here, the effect is negative, meaning if the central bank is more independent people feel less happy on average. It seems counter-intuitive and against what the literature suggests. In consideration of the effects of transmission channels, if the fact that "the more independent a central bank is, the better the macroeconomic environment is" is true, the influence should be positive. This empirical result, however, suggests another way around. There might be other explanation for people's feeling about CBI. Alesina and Grilli (1992) explain that the median voter has the intendency to appoint a central bank governor who is more averse to inflation than he is, but recalls the governor if he is too conservative ex post. It suggests that people may not like the government to be too weak when facing economic issues.

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Instead, they prefer a big government which has more policies tools. In other words, they might prefer to see the government is really doing things to tackle with the current problems.

	(1)	(2)	(3)	(4)
VARIABLES	happiness	happiness	happiness	happiness
CBI	-0.0972***	-0.0673*	-0.109***	-0.0770**
	(0.0352)	(0.0353)	(0.0353)	(0.0354)
unemployment		-0.0165***		-0.0161***
		(0.00136)		(0.00136)
inflation			-0.000269***	-0.000198***
			(6.79e-05)	(6.82e-05)
GDP	0.113***	0.0363	0.114***	0.0392
	(0.0234)	(0.0245)	(0.0234)	(0.0245)
age	-0.00661***	-0.00659***	-0.00659***	-0.00658***
	(0.000193)	(0.000193)	(0.000193)	(0.000193)
female	0.0491***	0.0497***	0.0491***	0.0497***
	(0.00492)	(0.00492)	(0.00492)	(0.00492)
married	0.232***	0.233***	0.232***	0.233***
	(0.00576)	(0.00576)	(0.00576)	(0.00576)
income	0.0708***	0.0711***	0.0710***	0.0713***
	(0.00122)	(0.00122)	(0.00122)	(0.00122)
unemployed	-0.161***	-0.158***	-0.160***	-0.158***
	(0.00923)	(0.00923)	(0.00923)	(0.00923)
children	0.000446	0.000289	0.000350	0.000223
	(0.00189)	(0.00189)	(0.00189)	(0.00189)
education	0.0331***	0.0326***	0.0327***	0.0324***
	(0.00332)	(0.00332)	(0.00332)	(0.00332)
Country	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	211,970	211,970	211,970	211,970

Table 4

Note:

1. Robust standard errors in parentheses.

2. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

As for unemployment and inflation. Unemployment and inflation both have the negative signs as expected. Also, the effect of unemployment is larger than that of inflation, meaning unemployment is less favourable than inflation on average. However, the literature usually has the relatively limited numbers of countries and regions. For example, Alesina et al. (2004) use the data of the US and European countries (including Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, and the United Kingdom). In addition to these countries, Di Tella et al. (2001) also include Portugal, Greece and Spain. Similarly, Wolfers (2003) also uses 16 European countries to draw this conclusion. We can see the literature usually uses data from richer or more developed countries and limits the regions to the US and Europe (except for East Europe). In this thesis, instead, I use data from 82 countries around the world, not confined to these areas only. Therefore, I roughly split this data into two groups based on their GDP to see the possible difference between areas, and find out that inflation has significant influence on happiness while there's no effect from unemployment for those countries with higher GDP (column 1 in Table 5), and vice versa for the countries with lower GDP (column 2).

Table 5

VARIABLES	(1) Higher GDP happiness	(2) Lower GDP happiness
unemployment	0.0101	-0.0244***
	(0.00617)	(0.00157)
inflation	-0.00637***	-4.30e-05

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	(0.000768)	(7.07e-05)
Observations	86,584	125,386

Note:

1. Robust standard errors in parentheses.

2. *** p<0.01

3. Other main variables are not reported.

It indicates people's happiness may vary with some other macro and micro factors. The findings from literature about the effects of unemployment and inflation couldn't truly apply to countries beyond the US and Europe. Hayo (1998) points out "people living in countries with a low inflation record appear to be more sensitive to an increase in the actual inflation rate than people in higher-inflation countries.", meaning culture can also be a factor influencing. Here I use the mean GDP in the dataset to split the samples. This standard can be further examined or more possible factors should be taken into consideration to split the data, in order to study this phenomenon. Also, I predict that the transmission channels may influence people differently according to the environment where people are.

Regarding the effect of GDP, my result also supports literature there is Easterlin paradox, while the significance is sensitive to model specifications. As mentioned, this may be because people care more about relative income with others or they adapt their feeling with time (e.g. Luttmer, 2004; Easterlin, 2005).

Now I turn to the personal characteristics control variables. Again, from the Table 4, we can tell one is happier if one is younger, female, married, with higher income level,

not unemployed, or higher educated, while the number of children has no effect. We can also see personal income level is indeed related to one's feeling, which further supports the literature about Easterlin paradox.

Next, I estimate respectively the possible transmission channels effects of CBI via unemployment and inflation with the country and year fixed effects as controls. The Table 6 shows CBI has the opposite influences on the two macro variables. The effect of CBI on inflation is negative and it is way stronger than that on unemployment. The sign is expected as most literature. Also, the size indicates most of the central banks are aiming to stabilize inflation compare to unemployment. In addition, due to the finding in Table 5, it seems that the CBI doesn't affect happiness via the two channels at the same time even though the variables both have negative effects in the Table 4. It's either go through unemployment or inflation based on the current macroeconomic environment (or other factors to be further specified). Particularly, in higher GDP countries CBI can influence people's feeling by inflation, while the central bank should resort to unemployment if it's in a lower GDP country.

Table 6

	(1)	(2)
VARIABLES	unemployment	inflation
CBI	1.979***	-10.11***
	(0.0497)	(1.024)
Observations	236,134	236,134

Note: 1. Standard errors in parentheses. 2. *** $p < 0.01$

Since happiness data is a measure for people's feeling, I try to split the dataset according to different personal characteristics of interest, including age, employment status, education level, and income level, and run the similar regression as in the column (4) of the Table 4. The results are shown in Table 7. The mean age of the dataset is 41 so I split the observations into groups of older or younger than 41. Regarding education level, those with higher or equal to middle education level are grouped in higher level, or they will be in the lower level group. Similarly, people with income higher than the fifth level of the dataset will be grouped in higher income level, or the other group. Except for employment status, splitting the dataset based on all the other three personal characteristics into two groups makes difference. The effect from the separation based on employment status is larger for the unemployed than the other group of people. There is one thing to note. The result is only significant with 90% confidence so that it's not really convincing enough to conclude CBI has different effects on the two groups. Other results show that CBI has no significant effect on people who are in the group of older generation, higher education level, or higher income level. In contrast, for those in the group of younger generation, lower education level, or lower income level, CBI has a significantly negative influence. This supports the finding in the Table 4 and may further indicate those who are relatively more vulnerable people of a country care more if the government signals it has policies to enhance their life quality, which is reflected by the happiness

data. According to the Public Choice theory, this finding justifies politicians' motivation

to pursue a less independent central bank and to create political business cycle, namely

interfering the monetary policy to temporarily decrease unemployment and inflation.

Table 7

Personal characteristics		Coefficient
Age	Older	0.0684
	Younger	-0.220***
Employment	Unemployed	-0.237*
	Not unemployed	-0.0618*
Education	Higher level	0.0630
	Lower level	-0.513***
Income	Higher level	0.102
	Lower level	-0.141***

Note:

1.   *** p<0.01, ** p<0.05, * p<0.1

2.   People older than 41, which is the mean age of the dataset, will be
     categorized as older, or otherwise. People with at least middle
     education level are categorized as higher level, or otherwise.
     People with income higher than the fifth level are in the group of
     higher level, or otherwise.

In consideration of the time lag effect, the current CBI may not really have effect on

people's happiness. To put it in another way, CBI should be considered as a long-term

effect. It probably can have influence on happiness level more than just the current time

being. Therefore, it's meaningful to add lag terms of CBI in the regressions to find out if

there is any chronological effect. Therefore, I choose to use respectively one-year and

two-year time lag of CBI instead to estimate the previous regressions.

First, I run the pool regression with every personal control variable and fixed effects,

and the results are shown in the Table 8. Except for the variable CBI, all other variables still have the expected signs with much statistically significance. The huge change is that CBI has no significance with one-year lag term, while having positive effect with two-year lag term. The sign is more intuitive than that of the regression in the Table 4. It may indicate that in the long run voters still want to have a central bank insulated from its government's interference even though in the short run they expect the government to be more powerful to overcome their economic difficulties. If it is this case, there exists a tradeoff for politicians. If they want to win the next election and catering to voter's preference, which is more interference in the economic market from the public sector, in the long run this vote winning will be at expense of the stable macroeconomic environment, which is also unfavourable to the voters. In fact, after using three-, four- and five-year lag terms, I still can find out that the effect of CBI is positive with 1% statistical significance (not reported in the Table 8). It means it can last at least as long as a general political election cycle (more likely 4 to 5 years).

This also can be further supported in the Table 9. In the Table 9, I run the transmission channel regression with two different time lag terms. Again, the signs remain the same as in the Table 5 with much significance. The level of unemployment and inflation are still under the influence of CBI level two years earlier, and the magnitude of inflation is still stronger than that of unemployment. It means the capability of a central

bank has long term and probably stronger effect and further influences people's happiness.

	(1)	(2)
Table 8		
VARIABLES	happiness	happiness
CBI_lag1	-0.0383	
	(0.0324)	
CBI_lag2		0.0753***
		(0.0282)
unemployment	-0.0136***	-0.0149***
	(0.00129)	(0.00133)
inflation	-0.000230***	-0.000162**
	(7.07e-05)	(6.89e-05)
GDP	0.0970***	0.0799***
	(0.0206)	(0.0202)
age	-0.00652***	-0.00668***
	(0.000189)	(0.000187)
female	0.0449***	0.0459***
	(0.00480)	(0.00473)
married	0.231***	0.233***
	(0.00564)	(0.00557)
income	0.0728***	0.0733***
	(0.00120)	(0.00118)
unemployed	-0.177***	-0.178***
	(0.00899)	(0.00884)
children	0.000334	0.000540
	(0.00187)	(0.00182)
education	0.0344***	0.0323***
	(0.00325)	(0.00318)
Observations	222,571	229,228

Note:

1. Robust standard errors in parentheses.

2. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

	(1)	(2)	(3)	(4)
VARIABLES	unemployment	unemployment	inflation	inflation
CBI_lag1	2.968***		-83.46***	
	(0.0429)		(0.854)	
CBI_lag2		4.599***		-50.57***
		(0.0374)		(0.773)
Observations	248,117	253,630	248,117	253,630

Table 9

Note:

1. Robust standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.1

Finally, I again split the dataset to run the regressions with five different time lag

terms respectively based on different personal characteristics, including age, employment

status, education level and income level, and the split standards are the same as in the

Table 7. Except for younger or lower education people, the results have the consistent

finding that in the long run the effect of CBI becomes positive. Especially, the divergence

happened before disappears. This phenomenon happens to every subgroup no matter they

belong to more vulnerable group or not. The only exceptions here are younger and lower

education level people. The Table 10 shows one-year lag CBI still negatively influence

younger generation. The positive effect only appears after four and five years. It seems

that the effect of CBI delays on this group, but it is still consistent to the previous finding.

Nevertheless, only does the effect on the lower education people show a different pattern.

The effect of CBI level of previous year is still negatively significant. The two-year lag

term is also negative but the significance disappears (only with 10% significance). The

effects three-, four, and five-year lag terms differ, but again without statistical significance. In other words, lower education people are the only group that CBI has no effect on according to the result presented here.

Therefore, in this thesis there are three main findings. First of all, in the short run, CBI can negatively influence people's happiness level, which means people tend to choose a big and more powerful government. It may indicate voters care more about if the government can impose some policies to influence their living environment. Particularly, the vulnerable groups such as those who are younger, have lower income or have lower education level. In contrast, those relatively superior groups in the society are more indifferent to their government's interference to the economic activities. However, in the long run the negative effect and indifference disappear. Instead, for almost all groups the effect becomes positive, suggesting that voters in the end still favour a more independent central bank, which can help stabilize the macroeconomic environment. This can be proved by the effects of the unemployment and inflation transmission channels. CBI will have a longer influence on these two macro variables. Finally, people's happiness might not be affected by unemployment and inflation at the same time. In lower GDP countries, the inflation has more influence, while in higher GDP countries unemployment affects more.

Table 10

Personal characteristics		Coefficient				
		1-year lag	2-year lag	3-year lag	4-year lag	5-year lag
Age	Older	0.0986**	0.197***	0.246***	0.304***	0.246***
	Younger	-0.150***	-0.0137	-0.000197	0.161***	0.0980***
Employment	Unemployed	-0.132	0.159	0.235**	0.409***	0.237**
	Not unemployed	-0.0372	0.0731**	0.0904***	0.203***	0.148***
Education	Higher level	-0.0115	0.165***	0.165***	0.293***	0.256***
	Lower level	-0.151**	-0.108*	-0.0569	0.0954*	-0.00176
Income	Higher level	-0.0974	0.0613	0.136***	0.244***	0.228***
	Lower level	0.00802	0.114***	0.112***	0.254***	0.210***

Note:

1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

2. People older than 41, which is the mean age of the dataset, will be categorized as older, or otherwise. People with at least middle education level are categorized as higher level, or otherwise. People with income higher than the fifth level are in the group of higher level, or otherwise.

6. Conclusion

A central bank plays a very important role in the modern economic system. Mainly it controls the monetary policy of the country and this control capability is protected and regulated under law. This philosophy is strongly supported by the literature, arguing any external interference will only cause worse macroeconomic environment than expected so that the best strategy is to let the central bank function independently from other executive pressure to pursue the best performance of the economy. This view isn't shared by all researches. Still, some empirical studies show a very independent central bank cannot guarantee a better macroeconomic performance and it may be another way around. In addition, from the point of view of political economics, politicians' objective is to win as many as votes as possible to gain the executive power (again). Facing their voters but without providing any policy seems to be too embarrassing to them.

Therefore, I estimate the influence of CBI on people's feeling via plausible transmission channels, and try to shed some lights on this kind of arguments. In order to do this empirical analysis, the measure for people's happiness and the level of CBI are harnessed. Happiness data was first used by Easterlin (1974) to study further about GDP. Due to the nature of subjectivity and reliability, more and more economic theories can be tested empirically, including the effect of institution I study here. Similarly, the first CBI indicator was constructed by Bade and Parkin (1977). Since then, different constructing

methods were developed to study the performance of central banks. The most comprehensive indicator considering legal independence is from Cukierman et al. (1992). The method was adopted by many decedent researches.

Hence, I follow the literature and use the two data from the WVS and Garriga (2016) to run the happiness regression for 82 countries in the period from 1991 to 2012, as well as the transmission channels to connect CBI and happiness, namely unemployment and inflation. I also split the sample into subgroups based on such as age, employment status, income level, and education level. In addition, the lag effect of CBI is considered.

The empirical results show the negative relationship between CBI and happiness. The vulnerable groups of a society particularly would favour a big government, but the effect only lasts shortly. When the period as long as five years is considered, the influence turns to be the opposite for each subgroup except for the lower educated. The results of the transmission channels further indicate in the long run people care the macroeconomic performances more. Only the influences might not happen simultaneously. Given the results presented, for politicians pursuing self-interest, the dilemma is met.

The study looking into the relationship between CBI and happiness is rare in literature. The countries and time period covered here is relatively large and new. Also, the thesis probably is the first one to see the influence of CBI from personal's perspectives with happiness data. For the future studies, the standards for splitting countries or people can

be adjusted and endogeneity can also be considered.

Appendix 1

Country in the dataset

No.	Country
1	Albania
2	Argentina
3	Armenia
4	Australia
5	Azerbaijan
6	Bangladesh
7	Belarus
8	Bosnia and Herzegovina
9	Brazil
10	Bulgaria
11	Burkina Faso
12	Canada
13	Chile
14	China
15	Colombia
16	Croatia
17	Cyprus
18	Czech Republic
19	Dominican Republic
20	El Salvador
21	Estonia
22	Ethiopia
23	Finland
24	France
25	Georgia
26	Germany
27	Ghana
28	Guatemala
29	Hungary
30	India
31	Indonesia
32	Iran, Islamic Rep.

33	Iraq
34	Italy
35	Japan
36	Jordan
37	Kazakhstan
38	Korea, Rep.
39	Latvia
40	Lithuania
41	Malaysia
42	Mali
43	Mexico
44	Moldova
45	Montenegro
46	Morocco
47	Netherlands
48	New Zealand
49	Nigeria
50	North Macedonia
51	Norway
52	Pakistan
53	Peru
54	Philippines
55	Poland
56	Qatar
57	Romania
58	Russian Federation
59	Rwanda
60	Saudi Arabia
61	Serbia
62	Singapore
63	Slovak Republic
64	Slovenia
65	South Africa
66	Spain
67	Sweden
68	Switzerland
69	Tanzania

70	Thailand
71	Trinidad and Tobago
72	Turkey
73	Uganda
74	Ukraine
75	United Kingdom
76	United States
77	Uruguay
78	Uzbekistan
79	Venezuela, RB
80	Vietnam
81	Zambia
82	Zimbabwe

Appendix 2

CBI Indicator Coding Criteria

Component 1: Central Bank Governor (0.20)	
Dimensions (weights)	Criteria (score)
1. Term of office of CEO (0.25)	- Equal or more than 8 years (1) - 6 years or more but less than 8 years (0.75) - Equal to 5 years (0.50) - Equal to 4 years (0.25) - Less than 4 years (0)
2. Who appoints the CEO (0.25)	- The Central Bank Board (1) - Council composed by executive and legislative branch and Central Bank Board (0.75) - By legislative branch (0.50) - By executive branch (0.25) - By one or two members of executive branch (0)
3. Provisions for dismissal of CEO (0.25)	- No provision (1) - Only for non-policy reasons (e.g., incapability, or violation of law) (0.83) - At a discretion of Central Bank Board (0.67) - For policy reasons at legislative branch's discretion (0.50) - At legislative branch's discretion (0.33) - For policy reasons at executive branch's discretion (0.17) - At executive branch's discretion (0)
4. CEO allowed to hold another office in government (0.25)	- Prohibited by law (1) - Not allowed unless authorized by executive branch (0.5) - No prohibition for holding another office (0)
Component 2: Central Bank Objectives (0.15)	
Dimensions (weights)	Criteria (score)
5. Central Bank objectives	- Price stability is the only goal (0.8) - Price stability along with other objectives that do not seem to conflict with the former (0.6) - Price stability along with other objectives of potentially conflicting goals (e.g., full employment) (0.4) - Central Bank charter does not contain any

| | objective (0.2) |
| | -Some goals appear in the charter but price stability is not one of them (0) |

Component 3: Policy Formulation (0.15)

Dimensions (weights)	Criteria (score)
6. Who formulates monetary policy (0.25)	- Central Bank has the legal authority (1) - Central Bank participates together with government (0.67) - Central Bank in an advisory capacity (0.33) - Government alone formulates monetary policy (0)
7. Government directives and resolution of conflicts (0.50)	as objectives (1) - Government has final authority over issues not clearly defined as Central Bank goals (0.8) - Final decision up to a council whose members are from the Central Bank, executive branch, and legislative branch (0.6) - Legislative branch has final authority (0.4) - Executive branch has final authority, but subject to due process and possible protest by Central Bank (0.2) - Executive branch has unconditional authority over policy (0)

Component 4: Central Bank Lending (0.50)

Dimensions (weights)	Criteria (score)
8. Central Bank given active role in formulation of government's budget (0.25)	- Yes (1) - No (0)
9. Limitations on advances (0.30)	- Advances to government prohibited (1) - Permitted but subject to limits in terms of absolute cash amounts or relative limits (government revenues) (0.67) - Permitted subject to relatively accommodative limits (more than 15 percent of government revenues) (0.33) - No legal limitations on advances. Subject to negotiations with government (0)

10. Limitations on securitized lending (0.20)	- The same as in 9
11. Who decides control of terms of lending to government (0.20)	- Central bank controls terms and conditions (1) - Terms of lending specified in law, or Central Bank given legal authority to set conditions (0.67) - Law leaves decision to negotiations between the Central Bank and government (0.33) - Executive
12. Beneficiaries of Central Bank lending (0.10)	- Only central government (1) - Central and state governments, as well as further political subdivisions (0.67) - Also public enterprises can borrow (0.33) - Central Bank can lend to all of the above and to the private sector (0)
13. Type of limits when they exist (0.05)	- As an absolute cash amount (1) - As a percentage of Central Bank capital or other liabilities (0.67) - As a percentage of government revenues (0.33) - As a percentage of government expenditure (0)
14. Maturity of loans (0.05)	- Limited to a maximum of 6 months (1) - Limited to a maximum of 1 year (0.67) - Limited to a maximum of more than one year (0.33) - No legal upper bounds (0)
15. Restrictions on interest rates (0.05)	- Must be at market rate (1) - On loans to government cannot be lower than a certain floor (0.75) - Interest rate on Central Bank loans cannot exceed a certain ceiling (0.50) - No explicit legal provisions regarding interest rate in Central Bank loans (0.25) - No interest rate charge on government's borrowing from Central Bank (0)
16. Prohibition on Central Bank lending in primary market to Government (0.05)	- Prohibition from buying government securities in primary market (1) - No prohibition (0)
Source: Garriga (2016)	

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