The impact of real estate, inequality and current account imbalances on excessive credit: A cross country analysis

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Abstract

The numerous financial crises in the 20th and 21st century demonstrate the role of excessive credit as the main instigator of financial crises. Could this excessive credit be natural byproducts of lingering economic ailments such as, income inequality, property bubbles and persistent current account imbalances? This study attempts to answer this question by applying the Least Squares Dummy Variable (LSDVC) and dynamic GMM estimations based on the data of ten countries from the year 2004 to 2012. Whilst past literature have investigated the effect of income inequality, dominant real estate sector and current account imbalances on excessive credit separately, this study extends the literature by examining the impact of all three variables on excessive credit aggregately. Our findings tend to indicate that there do exist a positive relationship between all three variables and excessive credit. However, we found that only income inequality and the real estate sector contribute significantly to excessive credit but current account imbalances only marginally do so. We also discovered that the contribution to excessive credit by the banking sector is just about twice the amount of all three variables combined. Our results serve as evidence for policymakers interested in reducing excessive credit by controlling all three variables as well as the banking sector.

Keywords: Excessive Credit, Inequality, Real Estate, Current Account Imbalances, Credit-to-GDP Gap.

JEL: C22, C58, E44, G15

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Introduction

Although it is not possible to say that there is a unanimous agreement between scholars towards the contribution of financial development to economic growth, most scholars do not doubt it, given the abundant and diverse evidence that supports the Finance-Growth Nexus (Levine, 2005). However, the Nexus has been marred by periodical Financial Crises which threaten not only to undo its benefits, but also to inculcate major challenges into the economy, such as widening income gaps and global imbalances (Atkinson et al, 2013).

Understanding financial crises remains a complex task. A number of authors have suggested a myriad of reasons, but an overpowering theme emerges among all: excessive credit is the best predictor of a financial crisis (Terrones IMF, 2004).

How did the modern world become over dependent on credit as a source of growth, only to find that the seemingly valuable credit leads to a devastating Financial Crisis? Scholars again argue extensively on the theoretical sources of credit, with some suggesting natural economic reasons such as the credit cycle (Fisher, 1933) or institutional factors such as Berger and Udel (2004)'s Institutional memory. Some also suggest that it is unwarranted government guarantess (Corsetti et al, 1998) that contributes to excessive credit. The recent 2008 financial crisis triggers the belief that it is exotic financial securities and other financial innovations that brought about excessive credit. (Mian and Sufi, 2007)

An extensive study in the aforementioned literature yields the conclusion that there is a lack of synergy and cohesion amongst the theoretical sources of credit. This leaves the study to conclude that the only valid inference is that the theoretical sources of credit is inconclusive and requires further study.

From the empirical point of view, Gabrial and Rosenthal, (2007) demonstrated evidences supporting the role of real estate and the credit cycle in the buildup of excessive credit. However, their findings were based on data ranging from 1992 to 2004 only, which excludes the crucial 2008 financial crisis. Their analysis were also done using Anderson and Hsiao's (1982) Instrumentral Variable (IV) one step and two step estimator which addresses the problem of endogeneity but perform poorly in Monte Carlo simulations according to Bruno (2005)

Obstfeld and Roggoff (2009) demonstrated with a barrage of stylized facts the correlation between global current account imbalances and excessive credit. However, a relationship between global current account imbalances and excessive credit by way of econometric techniques was not investigated.

Finally, past empirical findings on the relationship between inequality and excessive credit has been contradictory. As an example, Smith (2001) showed a positive relationship between inequality and excessive credit by using panel data regressions. On the other hand, Bruckner et al (2010) demonstrated a negative relationship between inequality and excessive credit through a multivariate time series analysis.

These past empirical findings also did not investigate the aggregate impact of multiple variables on excessive credit. To the best of our knowledge there exists no empirical investigation that investigate the aggregate impacts of inequality, the real estate sector and current account imbalances on excessive credit in an economy which motivates this study.

Apart from the reason mentioned previously, this paper is also motivated by the fact that there are strong evidences in another line of literature that demonstrate how the dominance of real estate, balance of payments imbalances and inequality are natural by-

products of Economic Growth (Mccombie and Thirwall, 1995; Kuznets, 1955; Friedman, 1957).

Therefore, as an economy grows and develops, these three factors will increasingly become more prominent and will contribute towards excessive level of credit in the economy, which if left unchecked, would result in a disastrous financial crisis which may culminate in a crippling economic recession.

Finding a solid relationship intertwined among the three variables and excessive credit levels will serve as a key evidence to urge policy makers to design policies that can contain all three variables in their economic growth strategies.

As an additional inquiry into the dynamic behaviour of excessive credit, we would like to investigate the effects of the presence of Islamic Finance in a country in a year on the level of excessive credit. This imperative is a result of past literatures such as Chapra (2011) whom suggested that Islamic Finance's insistence on tying financial transactions to an underlying real asset, as well as the risk sharing aspects of Islamic Finance should contribute to a negative relationship between the presence of Islamic Finance and excessive credit.

Therefore, in this paper we will be addressing the following research questions:

1. Does excessive levels of debt share a positive relationship with house prices, Gini Coefficient and current account imbalances in the long run?
2. Does the presence of Islamic Finance in any form in a country reduces the level of excessive credit?

Answering these questions will enable us to meet the paper's objectives. The overall objective is to investigate the relationship among excessive debt levels, real estate prices, inequality and current account imbalances.

To anticipate our results, we discovered that real estate, inequality and current account imbalances do share a positive relationship with excessive credit. However, only real estate and inequality have a large positive impact on excessive credit, current account imbalances only have a fractional positive impact on excessive credit. The presence of Islamic Finance is found to reduce the level of excessive credit, however, the impacts are so miniscule that they are indistinguishable from zero.

The paper shall be organised in the following way, section 1

Literature review

It is a well-known fact that financial development in a country or a region leads to growth in the real economy as shown by the literature on the Finance-Growth nexus. Levine (2005) provides a comprehensive summary of the theoretical underpinnings for the Finance-Growth Nexus.

Empirical supports for Finance-Growth Nexus are in abundance as demonstrated by Bekaer et al (2005), Xu (2000) and Jung (1986). All of the previously mentioned authors show empirical support for the Finance-Growth Nexus through the utilisation of Standard Time Series Techniques alone.

Periodically, however, the financial system tends to become unstable, with financial crisis looming ever closer, where the story could end with a ruinous economic recession. As illustrated by Kindleberger (1978), financial crises are not uncommon as they have been officially recorded as early as 1618.

What causes these detrimental financial crises? Many authors have tried to tackle this question, with some suggesting that it was weak structural factors (e.g too loose government regulations) that contributed to the 2008 Global Financial Crisis (Crotty,

2009). Others have suggested that Real Estate (Glaeser et al, 2008) and Global Imbalances (Obstfeld and Roggoff, 2009) might be the culprit.

However, a striking direct and indirect relationship between excessive credit and financial crises was found by many authors including Mian and Sufi (2008), Jimenez and Saurina (2006), and Jimenez et al (2008) among many others. The crux of the arguments in the aforementioned literature is that excessive credit leads to financial crisis through primarily two channels.

The first channel is that consumption is influenced directly by the amount of credit made available to consumers. Therefore, an excessive amount of credit made available to consumers would lead to an overstimulation of consumption in the economy way beyond potential output, causing the economy to overheat. This leads to inflation, deterioration of the current account and the exchange rate, and instability in the economy in general as the output and expenditure will have a tendency to move back to the equilibrium level.

The second channel is the fact that banks tend to be over-optimistic during boom periods and over-conservative during bust periods. During boom periods, banks give out excessive credits due to over-optimisms on the borrower's project NPV, and therefore they tend to extend credit even to negative NPV borrowers who ultimately default further down the line. Therefore, during boom periods, the credit market tends to be crowded out by potentially bad debtors.

However, as the boom period ends and as asset prices fall, default rates increase dramatically which increases the overall systematic risks, while the banks - which face deteriorating capital in their balance sheet - suddenly switch to an over-conservative mode. These banks therefore cut credit extensions and start to give lending only at the highest rates and to their best customers. This sudden credit crunch, if not dealt properly

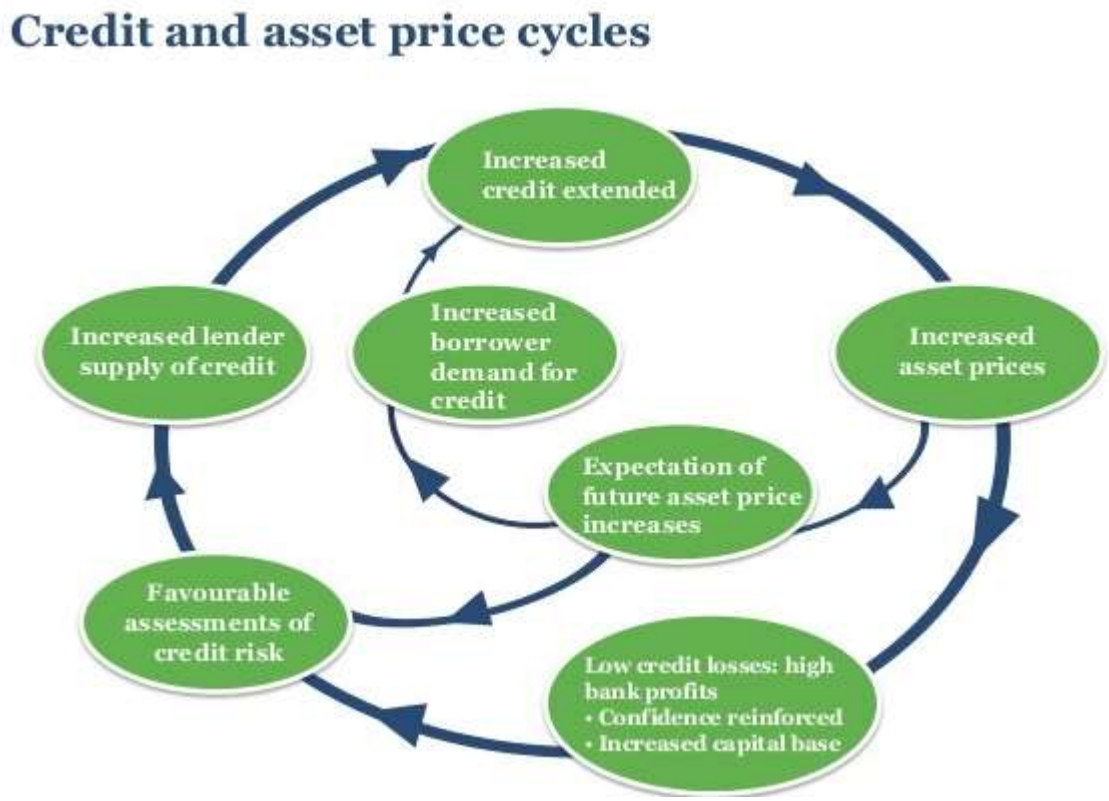
and prudently by authorities, will lead to a debt overhang effect, as discussed by Mian and Sufi (2008), which could lead to a recession in an economy. The US experience in the aftermath of the 2008 global financial crisis is a case in point.

The strength and clarity of the relationship between excessive credit and financial crises resulted in Basel III, which enforces comprehensive regulation in the banking sector that includes countercyclical capital buffers, among others (Basel Committee on Banking Supervision, 2011). These policies and regulations are aimed at limiting excessive credit creation so as to minimise the probability and the intensity of future financial crises. It suffices to say that the relationship between excessive credit and financial crises is not only intuitively clear, it is also supported by empirical evidence with explicit recognition by policy makers.

The subsequent question would be, how did economies accumulate such excessive credits and debts in the first place? Scholars have again investigated, from many angles, the sources of excessive credit. Fisher (1993) was the first to illustrate how the financial accelerator helped create excessive credit booms in an economy. His paper was then further extended by many others such as Bernanke, Gertler and Gilchrist (1996).

In addition to the financial accelerator, other writers have come up with other explanations. Mian and Sufi (2007) suggested that securitization and financial innovation was the source of credit booms. Corsetti et al (1998) illustrated that unwarranted government guarantees in the financial market could lead to excessive credit. Kindleberger (1978) had suggested that excessive credit can be borne out of the herding behaviours by banks. Agency problems could also be the root cause of excessive credit, as shown by Williamson (1963). Berger and Udel (2004) were the first to introduce ‘institutional memory’ as a possible source of excessive credit.

A majority of the scholars, however, found a strong relationship between excessive credit and three crucial factors; real estate, global imbalances and income inequality. Firstly, authors such as Gabrial and Rosenthal (2007) and Mian and Sufi (2007) showed how the rising importance of real estate as a share of wealth could lead to excessive credit in the economy mainly through the credit cycle, which is demonstrated in the figure below.



Credits: Institute for New Economic Thinking (INET)

Historically, most authors have applied the credit cycle above to macroeconomic variables such as the stock market or the bonds market. However, many overlook the fact that real estate sector is also another class of asset that is applicable in the credit cycle. In brief, the credit cycle starts with an increase in asset prices, in our case an increase in real estate prices which would affect two parties; the home owners and the banks.

With the increased in real estate prices, the home owner experiences a significant growth of their wealth relatively easily which increases their confidence in the real estate market

which then leads to an expectation of an increase in real estate prices in the future. The home owner would subsequently increase their demand for credit in order to invest in more real estate assets.

For the banks, the increase in real estate prices meant that the value of the collateral offered by home owners would increase over time compared to their static mortgages. Therefore, the rising real estate prices reduces the loss given default (LGD) of an individual home owner which would reduce the risk weights of that particular mortgage. Collectively this could lead to a higher capital base (as the banks can now give more loans) and higher bank profits which aggregately contributes to a higher bank confidence and a favourable assessment of credit risk. In the end, the rising real estate prices could lead to an increase in the supply of credit in the real estate market.

As a result of the increase in the demand and supply of credit in the real estate market, the absolute volume of credit in the economy would have increased. Furthermore, this increase in volume of credit would have likely been channelled into the real estate sector again, which could result in the further increase of real estate prices (assuming the supply of houses could not keep up with the growth of credit) and thus starting the cycle all over again.

Next, global imbalances are shown to be highly correlated to episodes of excessive credit in the economy, as illustrated by Obstfeld and Roggoff (2009), and Obstfeld (2009). The aforementioned literature's argument could be summed up in the words of Mervyn King (2010): "The massive flows of capital from the new entrants into western financial markets pushed down interest rates and encouraged risk-taking on an extraordinary scale…….Capital flows provided the fuel which the developed world's inadequately

designed and regulated financial system then ignited to produce a firestorm that engulfed us all."

Finally, Bruckner et al (2010) and Smith (2001) have demonstrated the relationship between income inequality and excessive credit. The crux of their argument is that the more unequal the wealth or income distribution is in an economy, the higher the levels of excessive debt would be. This is mainly caused by two reasons, firstly high inequality implies smaller groups of wealthy individuals that possesses easier access to credit compared to poorer individuals due to the collateral that is initially endowed to them. These initially endowed wealthy individual might cause excess credit in the economy by borrowing large amounts of credit for less valuable projects and crowding out the poorer but more talented entrepreneurs.

Secondly, with rampant inequality in an economy, lower and middle income households face stagnant and deteriorating real income, and in their effort to maintain the same level of consumption, they borrow more and more credit to meet their deficit.

The literatures mentioned above showed how each factor could contribute to excessive credit levels in an economy that most likely would lead to financial crises. However, to the best of our knowledge, there exists no empirical investigation on whether all three factors play an intertwining role to the creation of excessive credit in an economy.

It is in this niche of the literature that our paper humbly attempts to fill. Specifically, we aim to discover whether the combined influence of the increasing importance of real estate in an economy, global imbalances and inequality all contribute significantly to excessive level of credit in an economy, with which we proxy for the likelihood for the economy to encounter financial crises.

It is crucial to investigate the intertwined relationship among these factors because it is unlikely that excessive credit is sourced only from one factor alone.

There exists another line of literatures whom demonstrate the fact that, as economies grow and progress forward, inequality, global imbalances and real estate will naturally plague the economy (Friedman, 1957; McCombie & Thirwall, 1995; Kuznets, 1955). Therefore, if these three factors show a strong link with excessive levels of credit, then as economies grow, they will inevitably suffer from unstable levels of credit which would lead to devastating financial crises. Therefore it is imperative that policy makers should design policies, alongside their growth policies, that at least tackle and reduce the effects of these three factors.

It is with this notion in mind that we begin our investigation with the description of our data and methodologies.

Methodology

In the present paper, we intend to test empirically the impact of real estate, inequality and current account imbalances on excessive credit levels. In the pursuit of this objective, we shall employ the Least Square Dummy Variable Corrected (LSDVC) estimator as our main findings whilst the Standard (or Differenced) Generalised Method of Moments (GMM) shall serve as our robustness tests.

Even though the LSDVC estimator does not address the issue of strict exogeneity, Monte Carlo simulations done by Judson and Owen (1999) as well as the more recent Bruno (2005) demonstrated the fact that the LSDVC estimator has a relatively small variance compared to GMM and Anderson and Hsiao(1982)'s Instrumental variable (IV) estimators. This is only true under the assumption of strict exogeneity as well as when

the number of cross sectional observations (N) is small. When there exists evidence of endogeneity or even weak exogeneity, coupled with a large N in the balanced or unbalanced data set, Bruno (2005) warns against the usage of the LSDVC estimator, instead, either the Standard or System GMM is preferred.

However, findings from Bun and Kiviet (2003) shows promising evidence for the usage of the LSDVC estimator despite the existence of endogeneity or weak exogeneity. This is true if, and only if, the size of N is relatively small.

Therefore, based on the previous econometric literature that relies on Monte Carlo simulations, it seems that the econometric technique best suited for our study would firstly be the LSDVC estimator and secondly the GMM family.

This is because our study includes only 10 countries per year and therefore only 10 N (the nature of our data imposes data limitations on our study), which is a problem for GMM techniques since they require a relatively large N. Had we relied solely on GMM techniques under these circumstances, our GMM results would be imprecise compared to LSDVC estimations according to Jusdon and Owen (1999) as well as Bruno (2005)

We also found that there are evidence of autocorrelation as well as a moderate amount of persistency in our dependent variable which implies the requirement of a dynamic technique, therefore static techniques such as Pooled OLS, Fixed effect and Random Effects are not well suited for our study.

Since our time series data is only up to 9 years (or 9 T) we are therefore unable to utilise Pooled Mean Group (PMG) and Mean Group (MG) techniques both of which requires long time series observations to be viable.

We also discovered that none of our variables are strictly exogenous, and almost all of them are weakly exogenous, therefore, an issue of inconsistency exists in our estimations.

Thus, it is important that we utilise techniques such as the GMM which addresses inconsistencies of the variables, at least as a robustness test to our LSDVC estimations.

Our model under LSDVC and Differenced GMM is described below;

$$GAP_t = Q_t + RE_t + CA_t + GDP_t + GFCF_t + CPI_t + BANKS_t$$
$$+ RExBANKS_t + IF_t + \varepsilon_t$$

Where GAP_t the level of excessive credit in a country in a year, Q is the level of inequality in a country in a year, RE is house prices in a country in a year, CA is the current account balance of a country in a year, these four initial variables constitutes our focus variables.

Next, we include control variables used in previous literatures which include the Gross Domestic Product of a country in a year (GDP), the Gross Fixed Capital Formation of a country in a year (GFCF, a variable for investment), and the Consumer Price Index of a country in a year (CPI).

We then include some secondary focus variable in our model which are designed to investigate the relationship between excessive credit and the three variables further. These variables include the level of private credit extended by banks in a country in a year (BANKS), whilst RExBANKS is an interactive term designed to pick up the indirect relationship between real estate and excessive credit through the banking institutions, and finally, IF is a dummy variable designed to pick up the presence of any form of Islamic Finance in the economy (Islamic Banking, or Takaful or Sukuk) and finally ε is the error term. All variables are in Logarithmic form except for the IF dummy variable and the error term.

In brief, our focus variable Q (inequality), RE (real estate) and CA (current account imbalance) stems from the theoretical foundations laid down by previous literatures

Q is included in our model to investigate the effects of inequality on excessive credit. As shown by Bruckner et al (2010) and Smith (2001), Q may contribute positively towards excessive credit due to their relationship explained in our literature review.

This is the same for the variable RE. This is because real estate may contribute towards excessive credit through the credit cycle mentioned previously (Gabrial and Rosenthal, 2007; Mian and Sufi, 2007). Therefore, we expect that the coefficient of RE would be positive.

CA is included to capture the effects of current account imbalances of countries on excessive credit. This variable is motivated by Obstfeld and Roggoff (2009) who suggested that there may exist a positive relationship between current account imbalances and excessive credit.

As for our control variables; GDP (economic growth), GFCF(investments), and CPI(general price level), is included to control for the normal movements of credit in a country. Terrones (2004) suggested that the level of credit in a country follows three main factors; financial deepening caused by economic growth, normal cyclical movements caused by the business cycle and excessive cyclical movements caused by excessive credit booms.

It is only the excessive cyclical movements that is of our interest in this paper. However, to control for the other two factors, we have included GDP to control for economic growth effects, and we have also included the GFCF and CPI to control for normal business cycle effects.

We suspect that banks may contribute to excessive level of credit by way of multiple channels such as through the credit cycle mentioned previously by Gabrial and Rosenthal (2007), and securitizations as well as exotic financial instruments. Therefore, we have

included the vaiables BANKS and RExBANKS to investigate the effects of the banking sector on excessive level of credit. The last variable, RExBANKS, is specifically introduced in order to discover the interactive effects of the banking sector together with the real estate sector on excessive levels of credit.

Finally, we have added IF as a dummy variable to capture the effects of the prescence of Islamic Finance of any form in a country in a year. This variable is motivated by previous literatures such as Chapra (2011) whom suggested that Islamic Finance's insistent on tying down the financial sector with the real sector enforces discipline in the financial sector and thus reducing excess credit. Therefore we expect that IF should have a negative coefficient in our model.

Below we provide the descriptive statistics and the correlation matrix of our model in Table 1 and 2.

Table 1: Descriptive statistics

Variables	Mean	Std. Dev.	Minimum	Maximum
GAP	1.365	0.285	-0.708	2.156
Q	1.607	0.174	1.422	2.139
RE	1.911	0.144	1.451	2.126
CA	1.272	0.236	-0.510	1.519
GDP	5.833	0.884	4.105	7.208
GFCF	5.129	0.874	3.252	6.417
CPI	2.181	0.465	1.744	3.544
BANK	1.910	0.298	1.311	2.494
IF	0.4111	0.495	0	1

Table 1 demonstrates the descriptive statistics of our model. All variables except for IF are in the logarithmic form, and therefore the absolute value of the mean should not be interpreted directly. Table 1 shows how our dependent variable is moderately volatile across the cross sectional countries as compared to GDP whom differs widely across countries. This suggest that excessive credit tend to not differ significantly across countries even if each country are in different phases of economic growth. Surprisingly,

the real estate sector and inequality have the lowest standard deviation in our model, which implies that the two variables tend to not differ much amongst our cross sectional countries.

Table 2: Correlation matrix

	GAP	Q	RE	CA	GDP	GFCF	CPI	BANKS	IF
GAP	1.00								
Q	0.061	1.00							
RE	0.051	-0.7*	1.00						
CA	-0.17	0.045	-0.3*	1.00					
GDP	0.22*	0.48*	-0.3*	0.33*	1.00				
GFCF	0.25*	0.44*	-0.2*	0.31*	0.99*	1.00			
CPI	-0.04	0.45*	-0.3*	0.24*	0.33*	0.318	1.00		
BANK	0.162	-0.4*	0.49*	-0.3*	0.08	0.104	-0.44	1.00	
IF	0.154	0.34*	-0.2*	0.179	0.65*	0.63*	-0.04	0.091	1.00

*indicates significance at 5% level

Next, Table 2 demonstrates the correlation matrix of our model. Table 2 suggest that excessive credit only moves inversely and significantly to macroeconomic variables such as GDP and GFCF, all other variables do not have any significant correlation with excessive credit.

Inequality tend to have a positive correlation with general economic growth variables such as GDP, GFCF and CPI, which conforms to Kuznets (1955). Interestingly though, inequality moves inversely with real estate and the banking sector which is counter intuitive. Perplexing as well is the fact that the real estate sector is shown to move inversely with almost all macroeconomic variables except for the banking sector whom it shares a strong, significant and positive correlation.

Data description

Our data includes the US, UK, Brazil, Uruguay, France, Greece, Iceland, Russia, Sweden and Italy from the year 2004 to 2012 and are balanced. These countries are selected based

on data availability as well as a similar economic experiences. Our data will be mainly extracted from Thompson-Reuters DataStream database.

Excessive credit levels shall be measured by the credit-to-GDP gap which is defined as;

$$GAP_t = RATIO_t - TREND_t$$

where,

$$RATIO_t = \frac{CREDIT_t}{GDP_t} * 100$$

Credits: BCBS

Annex 1

$CREDIT_t$ is a broad definition of private credit and GDP_t is the domestic GDP of the country. Whilst $TREND_t$ is an approximation of the sustainable average of the credit-to-GDP ratio based on the historical performance of the country. We employed the Hodrick-Prescott (HP) Filter suggested by Drehmann et al (2010) in our estimation of $TREND_t$. The Credit-to-GDP Gap is the ideal variable to measure excessive credit in a country in a year as recommended by Basel III's Basel Committee for Banking Supervision (BCBS). It is the variable with which Basel III's countercyclical capital buffers rely heavily on.

The dominance of real estate in the economy shall be measured by various national house price index in each observed countries. For example, the S&P/Case-Shiller National Home Price Index is used in the US, the Halifax House Price Index in the UK and the Residential Property Prices provided by the BIS for other countries. The key characteristics for these indexes is that they track the movements of house prices aggregately in their respective country. They take into account and track house prices in all urban and metropolitan areas, which is significant since urban residential properties have a higher chance of being at the centre of a housing bubble.

Inequality shall be measured by the GINI coefficient mainly due to its ability to capture all the components of income inequality between groups, within groups and overlaps (Lambert and Anderson, 1993). It is also the most widely cited measurement of inequality and therefore have a lesser issue of data availability.

External trade imbalances shall be measured by the current account balance of a country as a percentage of its GDP. The reasoning behind this is straightforward, since our goal is to measure the over-reliance of exports or imports of a country, the current account is the only appropriate measurement since it measures a country's external trade of real goods and services. We may not include both the current account and the financial account since they cancel out each other.

The dummy variable IF exist in the form 1 or 0 only. The dummy variable IF for a country in a year becomes 1 should there exists any presence of any Islamic Financial Institutions such as an Islamic Bank, Takaful Operators, Unit trusts fund (such as Tabung Haji) or there exists a Sukuk Issuance by any firm in the country. If there exists absolutely no Islamic Financial institutions or issuance of Islamic Financial Securities, then the dummy variable IF for that country for that year would be 0 (Brazil has absolutely no experience of Islamic Finance and therefore all of it's IF dummy variable for every year is 0). Therefore, the dummy variable IF essentially measures the effect of the presence of Islamic Finance in a country.

Results

Table 3 provides our main result for the study using LSDVC estimation. We begin by initialising the procedure using the Aralleno and Bond (AB) consistent estimator, together with a level of accuracy or precision of 3 and we customized the standard errors

using Bootstrapped standard errors of 50 to 100 replications. We assume all of our explanatory variables to be weakly exogenous.

Table 3
LSDVC – Primary results

Variables	(1)	(2)	(3)	(4)	(5)
GAP_{it-1}	1.13^{***}	1.034^{***}	0.748^{***}	0.87^{***}	0.84^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Q_{it}	1.54	0.399	0.694	1.4^{*}	1.66^{**}
	(0.204)	(0.690)	(0.481)	(0.113)	(0.089)
RE_{it}	-0.487^{**}	-0.407	-0.778^{*}	4.27^{***}	3.76^{**}
	(0.074)	(0.479)	(0.105)	(0.023)	(0.056)
CA_{it}	0.043	0.086	0.145	0.177	0.218^{*}
	(0.780)	(0.610)	(0.296)	(0.196)	(0.118)
GDP_{it}		3.15^{**}	0.919	0.264	-0.161
		(0.050)	(0.547)	(0.851)	(0.913)
$GFCF_{it}$		-0.157	0.591	0.621	0.77
		(0.860)	(0.414)	(0.394)	(0.271)
CPI_{it}		-1.71^{**}	-1.39^{*}	-1.86^{***}	-1.836^{***}
		(0.089)	(0.11)	(0.035)	(0.03)
$BANKS_{it}$			1.48^{***}	7.16^{***}	6.86^{***}
			(0.000)	(0.000)	(0.002)
$RExBANKS_{it}$				-2.998^{***}	-2.76^{***}
				(0.005)	(0.012)
IF_{it}					-0.085
					(0.476)

Note: numbers in parentheses are P-values
*** indicates significance at 1% level
** indicates significance at 5% level
* indicates significance at 10% level
GAP is the level of excessive credit, Q is the Gini coefficient, RE is the house price index, CA are current account imbalances, GDP is the National Income, GFCF is the level of investment, CPI is the general price level, BANKS is the private credit extended by banks and finally, IF is the presence of Islamic Finance in a country in a year

Before we interpret our estimation, it is worthwhile to reiterate our research objectives, in this paper, we are interested in discovering whether current account imbalances, Gini coefficient and house prices share a positive relationship with excessive credit as well as whether the presence of Islamic Finance in a country reduces excessive credit.

Models (4) and (5) in Table 3 suggest that all of our focus variable do indeed share a positive relationship with excessive credit. However, only inequality and real estate have a significantly strong positive relationship with excessive credit, current account imbalances on the other hand are only weakly significant at 10% significance level in model (5). We can also observe that the P-value for all three focus variables tend to decrease as we add more relevant variables from model (1) through model (5). This suggest that with the addition of more relevant variables, we are edging closer to discovering the relationship amongst our focus variable with excessive credit. In contrast, GDP seems weakly significant at first but suffers from a growing P-value as more variables are added.

The positive and substantial relationship shared between inequality and excessive credit is in line with Bruckner et al (2010) and Smith (2001), models (4) and (5) predicts that a 1% increase in the level of inequality could lead to a 1.4% to 1.66% increase in excessive credit. The possible explanation for this relationship could be that rising inequality meant that the income and wealth disparity between the rich and the poor is growing, therefore implying two things; the middle and low income earners are facing stagnant or deteriorating real income whilst the high income earners are earning higher and higher real income.

A deteriorating real income to the middle and low income earners meant that they could afford less and less goods and services which must subsequently meant that their level of utility is decreasing as well. However, economic agents really do not want to reduce their level of utility, the low and middle income earners would prefer to have their levels of utility increased over time or at least maintained at the same level but certainly not decreased. Therefore, these low and middle income earners maintained the same level of utility despite deteriorating real income at the cost of more and more credit. This is

especially viable if mortgage refinancing is made available to them as was shown in the 2008 Global Financial Crisis.

High income earners on the other hand, faces an increase in their real income over time. This leads to an increased amount of assets under the control of high income earners. With more assets, high income earners are able to secure more loans and credit more easily due to the fact that more assets means more collateral may be offered to creditors

Models (1), (2) and (3) at first suggest a direct negative relationship between the real estate sector and excessive credit. However, upon adding the interactive variable RExBANKS in models (4) and (5), the direct relationship between real estate and excessive credit turns positive. This suggest that there are at least two different types of relationship between real estate and excess credit, one is a direct relationship that is positive and very substantial whilst the second negative indirect relationship is subtler but still significant. Essentially, our models (4) and (5) separates the direct and indirect relationship between real estate and excess credit through the interactive term RExBanks.

The direct positive relationship between real estate and excess credit is in line with Mian and Sufi (2007) and Gabrial and Rosenthal (2007), it also serve as an evidence for the Credit cycle explained in our literature review.

The negative indirect relationship is in contrast to the previous literature and the credit cycle. However, it must be reminded that the indirect relationship is represented by the interactive variable RExBANKS which essentially measures the relationship between real estate and excess credit through the banking sector. In essence, our results suggest that a strong real estate sector coupled with a strong banking sector could lead to lower levels of excessive credit. This is counter intuitive in countries such as the US where the banking industry and the real estate sector is believed to be working hand in hand in

promoting excess credit. However, it is also believed that this is only true if banks are able to securitize mortgages and sell them to third party investors as Collateralized Debt Obligations (CDO), essentially securitization and exotic financial innovation is present in these economies (Mian and Sufi, 2008). In countries such as Brazil, Russia and Uruguay where exotic financial securities remains uncommon if not unavailable, banks do not have a way to transfer credit risk from subprime mortgages off their balance sheet and therefore are more prudent in giving out house financing which could explain the indirect negative relationship between real estate and excess credit through banks.

Next, current account imbalances are found to be very weakly significant to excessive credit in model (5). However, in all five models, a positive coefficient is found which could hint at a possible positive relationship between current account imbalances and excessive credit which is in line with Obstfeld and Roggoff (2009). We suspect that a lagged form of current account may imbalances may be significant to excessive credit due to the fact that the current account imbalances this year may only end up as excess credit for next year, this is because institutional investors needs time to transform the current account surplus in one country into debt securities in another country.

It is unexpected for GDP and GFCF to be insignificant in 4 out of 5 models in our study. It also more surprising to observe the fact that the coefficient for GDP and GFCF in our study does not remain consistently negative as per our intuition of a higher income leading to a lower excess credit. This is because a higher level of GDP and GFCF meant that the income of the people has increased, if the level of excess credit does not change, then the higher income level should transform a portion of the ‘excess’ credit into sustainable debt. However, our results does not support this intuition.

CPI shows a consistently negative and significant relationship towards excessive credit meaning that a higher level of goods and services could lead to lower level of excessive credit. This result could be explained by the fact that as CPI increases, the real income of economic agents reduces which in turns lower their demand for credit.

One of the more prominent results of this paper is the significant and extremely large magnitude of the coefficient of the variable BANKS. Models (3) through (5) suggest that a 1% increase in the domestic private credit extended by banks, leads to a1.48% to 7.16% rise in excessive credit, a maximum of sevenfold increase. Our results, therefore suggest that it is the banking sector that contributed the most to excessive credit which is in line with Kindleberger (1978) and Berger and Udel (2004). Inequality, real estate and current account imbalances may contribute towards excess credit, however, they are relatively small compared to the contribution of the banking sector.

Finally, model (5) shows how the presence of Islamic Finance in a country have a negative effect on excessive credit, albeit an insignificant one This means that Islamic Finance do reduce and prevent excessive credit as per Chapra (2011), although since it is still in it's early stages of growth, it's effects are far too small and miniscule to be significant. This result can also be explained by the fact that the risk sharing aspects of Islamic Finance discourages and deters excessive level of credit. However, since risk sharing products in the current Islamic Financial Industry is still a minority, it is not able to significantly deter excessive credit in the economy.

Robustness checks

We shall estimate five Differenced GMM models to serve as our robustness checks in our studies. GMM estimates are utilised due to the fact that their estimators are consistent

and are controlled for the endogeneity issue which is not addressed in our earlier LSDVC estimations.

Table 4
Differenced GMM estimation – Robustness Check

Variables	(1)	(2)	(3)	(4)	(5)
GAP_{it-1}	0.747^{***}	0.757^{***}	0.375^{**}	0.292	0.528^{**}
	(0.000)	(0.000)	(0.071)	(0.209)	(0.079)
Q_{it}	4.84^{***}	0.0474	2.608^{***}	2.556^{***}	3.268^{***}
	(0.018)	(0.975)	(0.007)	(0.004)	(0.001)
RE_{it}	0.148	-0.171	-4.797^{***}	-2.094^{***}	-2.969^{***}
	(0.676)	(0.769)	(0.004)	(0.002)	(0.03)
CA_{it}	0.129^{*}	0.247^{***}	0.741^{***}	0.768^{***}	0.841^{***}
	(0.096)	(0.009)	(0.007)	(0.006)	(0.016)
GDP_{it}		-0.158	-2.042^{**}	-1.191^{**}	-2.332^{**}
		(0.917)	(0.047)	(0.065)	(0.083)
$/GFCF_{it}$		0.825	1.967^{***}	1.862^{***}	2.341^{***}
		(0.469)	(0.028)	(0.029)	(0.032)
CPI_{it}		-1.79	-1.01	-0.836	
		(0.428)	(0.163)	(0.35)	
$BANKS_{it}$			2.067^{***}		
			(0.001)		
$RExBANKS_{it}$				1.046^{***}	1.243^{***}
				(0.005)	(0.003)
IF_{it}					-0.196
					(0.109)
No. of Instruments	10	10	10	10	10
AR(1)/AR(2)	0.631/0.364	0.764/0.226	0.179/0.529	0.184/0.403	0.18/0.456
Hansen-J Test	0.293	0.131	0.46	0.478	0.386

Note: numbers in parentheses are P-values
*** indicates significance at 1% level
** indicates significance at 5% level
* indicates significance at 10% level
There exists 10 groups (10 N) in these estimations.
GAP is the level of excessive credit, Q is the Gini coefficient, RE is the house price index, CA are current account imbalances, GDP is the National Income, GFCF is the level of investment, CPI is the general price level, BANKS is the private credit extended by banks and finally, IF is the presence of Islamic Finance in a country in a year

Any model using GMM techniques need to pass three diagnostic tests to be valid, firstly, the number of instruments should not be higher than the number of groups, secondly, the/

Arellano & Bond test AR(2) null hypothesis of no second order autocorrelation should be accepted, and lastly, the Hansen J-test's Null Hypothesis that the Instrumental Variables are not correlated with the error term should also be accepted. (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998)

Table 4 demonstrates the diagnostic tests for our model. Our model operates with 10 groups and as shown in Table 4, all models contain 10 or less instrumental variables but never more than the number of groups. The P-values for AR(1), AR(2) and Hansen Test for all five models turns out to be higher than 0.05, meaning that the null hypotheses of No Autocorrelation and the Instrumental Variables being uncorrelated with the error term are accepted for all five of our models, which subsequently meant that the instruments used in our models are valid. (Yalta & Yalta, 2012)

Our robustness check confirms our primary findings earlier in the perspective of the positive relationship amongst inequality, current account imbalances and the banking sector towards excessive level of credit. It also confirms the negative but insignificant relationship the presence of Islamic finance have on excess credit.

However, our robustness checks differ from our primary findings by way of real estate, and the control variable GDP and GFCF. In the perspective of real estate and RExBANKS, the signs are reversed in our robustness checks as compared to our primary findings. Our robustness checks suggest that real estate has a direct negative relationship with excessive credit, whilst the indirect RExBANKS have a positive relationship with excessive credit.

From the perspective of GDP and GFCF, our robustness checks suggest a consistently negative and significant relationship between GDP and excessive credit, whilst a consistently positive relationship exist between GFCF and excessive credit.

However, in this case, we still would prefer the LSDVC estimator compared to the Differenced GMM estimator due to the fact that we only have a very small sample of 10 Ns which reduces significantly the performance and effectiveness of the GMM estimators.

Conclusions and Policy implications

This paper attempts to answer the question: Do inequality, current account imbalances and the real estate sector share a positive relationship with excessive credit? By utilising the LSDVC estimator, the paper discovered there is indeed a positive relationship between the three focused variables and excessive credit, however, only real estate and inequality have a sizeable positive relationship with excessive credit but current account imbalances only have a marginal positive relationship with excessive credit.

Thus, as a nation economically develops, issues such as an inflated real estate bubble, a highly imbalanced current account and significant levels of inequality could occur (Mccombie and Thirwall, 1995; Kuznets, 1955; Friedman, 1957). Our study suggests that these three issues could lead to more and more excessive credit which could ultimately lead to a financial crisis. Therefore, a statement can be made that if policy makers do not enact policies to address inequality, a dominant real estate sector or a highly imbalanced current account, then an economically developing nation is doomed to suffer from a financial crisis sooner or later.

The paper also discovered that the banking sector contributes just under twice the amount of excessive credit in the economy compared to all of the three focused variables combined. This could indicate that whilst the three economic focused variables do contribute to excessive credit, in our current time however, it is the banking sector that is the main instigator of excessive credit.

Finally, we discovered a negative but insignificant relationship between the presence of Islamic Finance and excessive credit which suggests that Islamic Finance might have the ability to reduce excessive credit in the economy, however, the effect is far too small to be significant.

We, therefore, recommend economic policies that deal with all three focused variables vis-à-vis the economic growth policies in order to stem the growth of excessive credit as a nation economically develops. We are completely aware that polices to tackle the three focused variables might run counter to growth policies, but we are astute in our belief that it is better to have a slower growth but a more stable economy, rather than having a rampant growth rate, only to decline and worsen the people's welfare when financial crises hit.

However, our results seem to suggest that it is the banking sector in the ten countries that were the prime contributor of excessive credit in these economies. Therefore, we suggest policies that re-regulate the banking sector following the deregulation of financial markets prior to the 2008 financial crisis. We also humbly suggest the idea that the current debt-based fractional banking system always had an incentive to promote excess credit in the economy, meaning that the modern form of banking could not help itself from promoting excessive levels of credit in the economy. We therefore suggest a major rethinking of the way modern banking is done with a view having more equity-based banking in the future.

We also recommend policies that encourage and promote the growth of the Islamic Finance Industry, since a significant growth in the Islamic Finance industry may lead to the industry being large enough to significantly reduce the level of excessive credit as suggested by our model. Policy makers should also focus on promoting risk sharing and

reducing risk shifting in the Islamic Finance Industry owing to the view that risk sharing should be able to significantly reduce excessive level of credit.

Limitations of the study

Our study is affected by three main econometric limitations of our technique. GMM has three main assumptions;

1. Linearity
2. Symmetry
3. Normality

The assumption of linearity meant that GMM assumes the relationship we found among the variables in our model does not change over time. This may or may not be true, which if the latter is correct then the relationship we found previously is true only for the time period between 2004 and 2012 and may be different at different time periods.

The assumption of symmetry meant that our model assumes a positive or negative change in our independent would have an equal impact on our dependent variable. For example, according to our chosen model (model 4 of Differenced GMM), an increase in the level of inequality by 1% should lead to an increase in the level of excessive credit by 2.556%. The assumption of symmetry means that a decrease in the level of inequality by 1% should also lead to a decrease in the level of excessive credit by 2.556%, again this may or may not be true. Many economic and financial variables are in fact asymmetric, meaning that a negative change might have a bigger impact on the dependent variable compared to a positive change, and vice versa.

Finally, the assumption of normality is mainly used in hypothesis testing. deriving the t-statistics and P-value. If this assumption are not met, then the P-values and significance of our independent are distorted. Ultimately, the efficiency of our model is affected.

There also exist issues with our variables, namely the Gini coefficient whom is widely criticised for not being an accurate measurement of inequality in a country.

Further research

Our study showed a positive relationship amongst excessive level of credit, current account balance, real estate and inequality. Future research should focus on investigating the exact factors that link the three variables to excessive credit, meaning that an inquiry must be made into how exactly do current account imbalances contribute to excessive credit or through what channel does inequality affect excessive credit.

Future studies must empirically answer these questions with a view to forming policies that address excessive credit at its root.

This paper could also be extended further by applying Non-linear Asymmetric Panel Data Techniques to further strengthen our estimations.

References

Aguiar, M., & Bils, M. (2015). *Has Consumption Inequality Mirrored Income Inequality? American Economic Review*, 105, 2725 - 2756.

Anderson, T. W., & Hsiao, C. (January 1982). Formulation and estimation of dynamic models using panel data. *Journal of Econometrics*, 18, 47-82.

Arellano, M., & Bond, S. R. (1991). Some tests specification for panel data: monte carlo evidence and an application to employment equations. *Review of Economic Studies*, 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variables estimation of error component models. *Journal of Econometrics*, 29-51.

Atkinson, T., Luttrell, D., & Rosenblum, H. (2013). *How Bad Was It? The Costs and Consequences of the 2007–09 Financial Crisis.* Dallas: Dallas Federal Reserve.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2001). Emerging Equity Markets and Economic Development. *Journal of development Economics*, 465-504.

Berger, A. N., & Udell, G. F. (2002). The Institutional Memory Hypothesis and the Procyclicality of Bank Lending Behavior. *Journal of financial intermediation*, 458-495.

Bernanke, B., Gertler, M., & Gilchrist, S. (1996). The Financial Accelerator and the Flight to Quality. *The Review of Economics and Statistics*, 1-15.

Blundell, R., & Bond, S. R. (1998). Initial Conditions and moment restricions in dynamic panel data models. *Journal of Econometrics*, 115-143.

BRÜCKNER, M., GERLING, K., & GRÜNER, H. P. (2010). Wealth Inequality and Credit Markets: Evidence from Three Industrialized Countries. *Journal of Economic Growth*, 155-176.

Bruno, G. (2005). Estimation and Inference in dynamic unbalanced panel data models with a small number of individuals. *The STATA Journal*, 473-500.

Bun, M. J., & Kiviet, J. F. (2003). On the diminishing returns of higher order terms in asymptotic expansions of bias. *Economic Letters*, 145-152.

Case, K. E., & Shiller, R. J. (1988). *THE EFFICIENCY OF THE MARKET FOR Single Family Homes.* Cambridge MA: NBER.

Chapra, M. U. (2011). The Global Financial Crisis: Some suggestions for reform of the global financial architecture in the light of Islamic Finance. *Thunderbird International Business review*, 565-579.

Corsetti, G., Pesenti, P., & Roubini, N. (1998). *Paper Tigers: A Model of the Asian Crisis.* New York: Federal Reserve of New York.

Crotty, J. (2009). Structural causes of the global financial crisis: a critical assessment of the 'new financial architecture'. *Cambridge Journal of Economic*, 563–580.

Fisher, I. (1933). The Debt-Deflation Theory of Great Depressions. *Econometrica*, 337-357.

Friedman, M. (1957). The Permanent Income Hypothesis. In M. Friedman, *A Theory of the Consumption Function* (pp. 20 - 37). Cambridge MA: Princeton University Press.

Gabriel, S. A., & Rosenthal, S. S. (2007). Secondary Markets, Risk, and Access to Credit Evidence From the Mortgage Market.

Glaeser, E. L., Gyourko, J., & Saiz, A. (2008). Housing supply and housing bubbles. *Journal of Urban Economics*, 198-217.

Judson, R., & Owen, A. (October 1999). Estimating dynamic panel data models: A guide for Macroeconomist. *Economics Letters*, 65, 9-15.

Jung, W. (1986). Financial development and economic growth: international evidence. *Economic Development and cultural change*, 333-346.

KindleBerger, C. (1978). *Manias, Panics and Crashes: A History of Financial Crises.* Palgrave Macmillan.

Kuznets, S. (1955). Economic Growth and Income Inequality. *The American Economic Review*, 1-28.

Levine, R. (2005). FINANCE AND GROWTH: THEORY AND EVIDENCE. In *Handbook of economic growth*, 865-934.

McCombie, J., & Thirwall. (1995). *Economic Growth and the Balance-of-Payments Constraint.*

Moshirian, F., & Wu, Q. (2012). Banking Industry volatility and economic growth. *Research in International Business and Finance*, 428-442.

Obstfeld, M., & Rogoff, K. (2009). Global Imbalances and the Financial Crisis: Products of Common Causes. *Federal Reserve Bank of San Francisco Asia Economic Policy Conference*.

Smith, D. (2001). International evidence on how income inequality and credit imperfections affect private savings rate. *Journal of Development Economics*, 103-127.

Stein, J. (1995). Prices and Trading Volume in the Housing Market: A Model with Down-. *Quarterly Journal of Economics*, 379-406.

Terrones, Marco, & Mendoza, E. (2004). *Are credit booms in emerging markets a concern.* World Economic Outlook.

Williamson, O. E. (1963). Managerial discretion and business behavior. *The American Economic Review*, 1032-1057.

Wolff, E. N. (2002). *Top heavy: The increasing inequality of wealth in America and what can be done about it,* New Press.

Xu, Z. (2000). Financial development, investment, and growth. *Economic Inquiry*, 331–344.

Yalta, A. Y., & Yalta, A. T. (2012). Does financial liberalization decrease capital flight? *International Review of Economics and FInance*, 92-100.