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CHINA'S URBAN CONSTRUCTION INVESTMENT BOND: CONTEXTUALISING A FINANCIAL TOOL FOR LOCAL GOVERNMENT

Abstract. This paper examines the Urban Construction Investment Bond (UCIB) as a tradable product in the financial market and a financial tool for local government in China. The development of this financial product is contextualised in infrastructure finance and local government debt. **The creation of UCIB helps finance infrastructure investment and potentially reveal the relative risks through the secondary market. The spatial distribution of UCIB demonstrates different relative risks of this financial instrument in local conditions. The government uses this financial tool to bridge the emerging capital market and infrastructure finance, and the Chinese financial market now treats UCIB as an emerging asset class. The development of UCIB has sped up the pace of financialisation in China. Although relative risks help investors choose different UCIBs, the overall risk of UCIB cannot be ignored.**

Key words: urban construction investment bond, financialisation, relative risks, infrastructure finance, China

1 Introduction

This study examines Urban Construction Investment Bond (UCIB) or *Chengtou* Bond as a species of local government debt in China, one that both reflects and mobilises the increasing pace of financialisation in China and the emergence of increasingly liquid capital markets (Tao *et al*, 2010; Tsui; 2011; Wong, 2013; Ye and Wu, 2014; Liu, 2019; Wu, 2019; Feng *et al*, 2020). There has been a growing strand of the literature on UCIB in China (Ambrose *et al*, 2015; Ansar *et al*, 2016; Pan *et al*, 2017; Huang and Du, 2018; Wu, 2019; Horn *et al*, 2019). We argue that existing researches tend to focus on *absolute* level rather than *relative* level of risks, **which in turn promotes confusion about the potential significance of UCIB as part of the toolkit available to local governments.** Absolute level of risk is associated with the stock and flow of UCIB, whereas relative risk, viewed from the perspective of financial instrument and market, is measured by adding an additional risk premium or spread relative to a benchmark such as the return of 10-year government bonds. Relative risk premium is a marked-up risk premium above the return of 10-years government bond, which is needed to

compensate investor for the risk of holding asset such as UCIB relative to the 10-year government bond. In this paper, we examine both absolute and relative risk in China's UCIB in order to better contextualise the UCIB.

Largely confined to domestic holders, the Chinese internal bond market was estimated at around 13 trillion USD, the third in the world after the US and Japan; China is becoming increasingly an important region to global asset managers and institutions (CNBC, 2019). The UCIB is used primarily to finance infrastructure and is classified as a sub-sovereign bond (Bo *et al*, 2017). The total outstanding stock of UCIB in China was estimated at 1.14 trillion USD by the end of 2018 (Wind, 2018). To the outside world, there is generally a lack of understanding of the institutions of the Chinese bond market in general, the market microstructure, and the issuance and distribution of UCIB by capital market in particular. Furthermore, these financial instruments remain largely inaccessible to outside investors as China's internal financial markets remain closed. The debut of China Bond Connect in 2017 represented a major milestone in the opening of China's capital market. In this context, the research in this paper seeks to understand the UCIB as an emerging asset class in China's financial market and as a tool for local governments. Our study has two main goals: firstly, to understand the role of Chinese capital market in financing infrastructure, secondly, to apply the framework of relative risk analysis **in order to contextualise the Chinese UCIB as a species of local government debt.**

Our empirical research makes several contributions to understanding the spatial and temporal dynamics of the UCIB. Firstly, we find attributes of spatial layer of risk being an important explanation for risk premium across China's regions. The UCIB issued by different regions comes with different location specific risk premia, an important source of relative risk that brings with it benefit of spatial diversification. **Secondly, the UCIB acts as an important gauge for China's economic infrastructure and the investment-driven economy and serves as a bridge between China's emerging regional capital markets and the regional real economy. We argue that existing scholarship** has understated the full potential and contribution of infrastructure as an asset class to China's financial system, and strategic role played by the state and the capital market in financing infrastructure in China. We argue institutions matter in the process risk transformation. From the perspective of financial market, the UCIB which remains largely domestic, inter-bank debts, serves the real economy against global business

cycle. In contrast to the global banking system of the last financial crisis which wreaks havoc with the real economy and pushes the world towards the recession, the banking system in China has seized the opportunity from the crisis to invest in long term infrastructure. As China's financial market continues to mature, the UCIB offers new opportunities as an asset class with stable, long-term yield to both domestic and international investors **and thus is a valuable species of local government debt.**

The remainder of this paper is structured as follows. First, we review the literature on the UCIB and explain why relative risk premium offers an alternative approach to understanding the risks associated with the UCIB. Second. We introduce our framework of analysis and provide the context for understanding the UCIB as an asset class. Third, we examine where the risks come from, how relative risks interact with spatial and temporal factors embedded in locality through the pricing mechanism. Finally, based on the preceding analysis, we conclude that UCIB is integral to the future development of China's infrastructure systems and capital markets. The future of UCIB depends on its potential as an asset class which bridges the **growth of regional real economies and growth of regional capital markets, which are part of China's longer-term path of financialisation. The continuous development of domestic capital markets particularly increasing participation by private sector,** and the demand for UCIB placed through different methods offers an investment tool which helps to provide for China's long-term future.

2 Literature Review

2.1 Yield Spread as Risk 'Barometer'

Yield spread measures the difference between the yield or return from one instrument to a benchmark. In finance and economic literature, there is a long strand of literature on risk attributed to yield spread due to its widespread use by economic forecasters and the finance industry. Economic forecasters in the central banks such as the US Fed have used various yield spreads of government bonds to forecast economic recession (Estrella and Mishkin, 1998; Gilchrist and Zakrajsek, 2012; Bauer and Mertens, 2018; Engstrom and Sharpe, 2019). Forecasters believe that yield spreads contain information on the likelihood of future economic recessions and the approach has been applied to forecast recession in the Euro area (Moneta,

2005), Italy (Brunetti and Torricelli, 2009), Germany (Nyberg, 2010.) and Japan (Hasegawa and Fukuta, 2011).

In the finance literature, there are two strands of literature on yield spreads. The first strand of literature focuses on the corporate yield spread and the impact on yield spread of macroeconomic factors. For example, Guha and Hiris (2002) revealed that benchmark interest rate has a direct effect on yield spread - when the economy was depressed, the bond's credit spread would be widened and when the economy improved, the bond's credit spread would be narrowed. In other words, the level of yield spread serves as a 'barometer' of risk to the economy. The change in corporate credit spread responds to the greater impact of the market (Collin-Dufresne and Goldstein, 2001) and the negative correlation between the growth rate of the gross national product and the bond spread is explained by the default risk and the market conditions of bond spread (Tang and Yan, 2008).

The second strand of finance literature focuses on risk premium and volatility associated with yield spreads at the micro level. For example, Elton *et al* (2001) showed that the default risk, revenue, liquidity risk and other systematic risks were the main factors that affected the bond's credit spread. The liquidity premium, the risk premium and the anticipatory breach of contract were important causes on the bond's credit spread (Brown *et al*, 2001; Covitz and Downing, 2007). Furthermore, there is a growing body of literature which focuses on the volatility of yield spread, starting from Campbell and Taksler's seminal article on option pricing and credit spread (2003), Cremers *et al*. (2008) found that implied market volatility is significantly related to credit spreads. To sum, the focus of economic and finance literature has been on the use of yield spreads as a forecasting tool while seeking to understand the causes of credit spreads, and particularly 'micro' factors that impact on yield spread.

The yield spread contains information about the future state of the economy and is instrumental as a 'barometer' of risk to the wider economy. Frequently used by financial analysts, the government yield spread or G-spread measures the difference between a bond's yield to maturity (YTM) to that of matched duration or to a long duration sovereign bond. The spread or the difference between the two represents 'micro' level relative risk or excess return for bearing greater credit and liquidity risks, that is above the rate of return for the benchmark sovereign yield such as 10 years government bond. Since 'macro' aspects of risk premia such

as expected inflation rate and expected real rate of interest are already embedded within the subtracted component of the benchmark sovereign yield, government yield spread specifically measures ‘micro’ aspects of relative risk premia such as credit, liquidity and sector risks. The greater the spread above the benchmark, the larger the idiosyncratic, mark-up ‘micro’ aspects of risk premia for holding specific bond or bond indexes.

This relative measure of risk and volatility has its origin in the approach of fixed income **analysis widely used in the industry** (Petitt *et al*, 2019). Jubinski and Lipton (2012), for example, found that bond yields and spreads respond to changes in equity market volatility in a manner consistent with a flight-to-quality effect, and both short and long-term Treasury yields fall in response to increases in implied volatility. However, little is known about how idiosyncratic, ‘micro’ aspects of government yield spreads across maturities and ratings spectrum systematically influenced and influenced by the volatility of equity and sector specific indexes and broader macroeconomic variables. **In order to elaborate the novelty of the UCIB as a species of local government debt**, the present study incorporates a relative risk framework based on government yield spreads to measure ‘micro’ aspects of relative risk premium; and secondly, decomposes relative risk premium into finer risk layers specific to UCIB. We further unpack ‘micro’ aspects of relative risk premium by attribution to spatial difference and the term structure across rating and maturity spectrum.

2.2 Relative Risk Premium in China’s UCIB

In terms of the literature on UCIB in China, the focus has been on absolute risk, e.g. the flow and stock of UCIB and its interaction with macroeconomic variables such as growth (Ambrose *et al*, 2015; Ansar *et al*, 2016; Pan *et al*, 2017; Horn *et al*, 2019). **Our approach instead involves decomposing the geographical composition of relative risk in order to tease out the ‘micro’ aspects of risk, rather than focussing on absolute measures such as aggregates of stock and flow or on fiscal constraints and GDP growth.**

For example, Province A might have accumulated a higher level of stock while having a larger flow of UCIB but can also achieve, in relative terms, a lower cost of capital due to the presence of a well-developed financial market and realised lower financing cost from past UCIB issue. Relative risk as measured by the UCIB’s spread with government bond in

Province A could be much lower than Province B when Province B had lower stock and flow of UCIB but higher cost of capital due to the absence of developed financial market and much higher financing cost. Thus, in terms of absolute risk, Province A might be higher than B due to a larger stock and flow of UCIB. However, in terms of relative risk, Province A could be lower than B due to lower government yield spread revealed through past interactions with capital market. The extent to which government yield spreads for China's UCIB are systematically affected by relative risk factors attributed to spatial difference and instrument level 'micro' risk factor is the focus of this paper. **By elaborating these dynamics, we are able to demonstrate the contribution that UCIBs make to the possible tools that local governments have for raising infrastructure finance.**

3. Method

To understand risk and the volatility of risk – i.e. why bond prices and yields-to-maturity change - is useful to first separate yield to maturity into two components: the benchmark and the spread. The benchmark yield for a corporate bond with 8% yield to maturity and 10 years' time to maturity is the base rate, a 10 years government bond. If the yield to maturity of 10 years government bond is 5%, the government yield spread (3%) is the difference between corporate bond's yield to maturity (8%) and the benchmark 10 years government bond (5%). The higher the level of the spread the riskier the bond. Government yield spread, therefore, serves effectively as excess return or additional compensation for bearing some additional idiosyncratic risks above the benchmark 'risk free' government bond.

Government yield spread can measure the difference between a bond's yield to maturity (YTM) to that of matched duration or long duration (typically 10 year) sovereign bond. The spread or the difference between the two represents 'micro' level, relative risk premium or excess return/risk premium for bearing greater credit and liquidity risks, a mark-up to 'risk free' rate of return of the benchmark sovereign yield. Finance professional typically use 10-years sovereign/government bond as a proxy for 'risk free' rate of return. The meaning of 'risk free' rate is the minimum threshold level of return investor must be satisfied before anything else is considered. Risk in addition to 'risk free' rate requires additional compensation. Since 'risk free' rate already includes key macroeconomic risk factors such as inflation, interest rate and country risk premium. Intuitively, anything above the 'risk free' rate would be considered

‘riskier’ and would need to be compensated with a mark-up relative risk premium above ‘risk free’ rate.

Therefore, government yield spread specifically measures ‘micro’ aspects of relative risk premia. The greater the spread above the benchmark, the larger the idiosyncratic, marked-up ‘micro’ aspects of risk premia for holding specific bond or bond indexes. In the context of UCIB, government yield spread measures UCIB’s sector risk and spatial risk associated with different regions/cities in China where the UCIB was issued, both are marked-up risk premium given the idiosyncrasy of different regions/cities in China and sector specific characteristics of UCIB as a construction bond. Additional ‘micro’ aspects of UCIB such as maturity and default risks are also included and will be ‘priced’ in the spread above benchmark rate based on time to maturity and equivalent credit rating.

For example, as shown in Figure 1, *16 Jiang Ning UCIB*¹ (1680452.IB and 139292.SH) was issued in 10 November 2016 to be retired in 11 November 2023 (7 years’ Time to Maturity from issue). On 21 August 2019 (dotted blue line demarcated end point on the graph), the bond was trading at a discounted price of 99.217 RMB (red line measured on the left vertical scale). Yield to maturity was 3.681% (green line measured on the right vertical scale). On the same day, the yield of 10 years government bond was 2.816%. The difference between the two was 0.86% (86 basis point) is the relative risk premium for holding *16 Jiang Ning UCIB* as compared with holding a ‘risk free’ 10 year’s government bonds.

Insert Figure 1

Pricing *16 Jiang Ning UCIB* as a financial asset with higher risk than government bond, investors would demand 0.86% or 86 basis point more to compensate for the risk of holding *16 Jiang Ning UCIB* in excess of ‘risk free’ government bond. Because the yield to maturity is inversely related to the price of the bond as shown, the higher the yield/risk the lower the price of the bond and vice versa, with price reflecting the force of demand and supply for bond. Relative risk, as defined here, will vary depending on the spread between individual bond and 10-year government bonds. The spread narrows as risk decreases. The spread widens as risk

¹ The issuer is Jiang Ning City Construction Company Limited, a Local Government Financing Platform (LGFP) for Jiang Ning District of Nanjing, the capital of Jiangsu Province. Website: <http://www.jncjtt.com/>

goes up. Additional risk measure can also be developed to gauge if the bond has lower or higher maturity risk by reference to equivalent duration, e.g. 7-year UCIB bond.

Relative risk as described above is the spread difference between UCIB and equivalent duration government bond or 10-year government bond. The level of relative risk represents ‘micro’ aspects of risk in excess of the government benchmark. The first order derivative of risk premia can be modelled to the volatility of idiosyncratic, ‘micro’ aspects of risk to the changes in a broad set of ‘macro’ variables such as inflation, interest rate and country risk premium, which have already been included within the yield of government bond. Holding these ‘macro’ risk factors constant, we can decompose ‘idiosyncratic’, ‘micro’ aspects of risk to two factors: (1) exposure to different region/city given the size of the Chinese economy and sub-sovereign nature of UCIB, (2) exposure to overall sectoral influences, (3) maturity and default risks. From the point of view of spatial change, UCIB has the first layer that is very different from other type of sub-sovereign debt. For this purpose, we focus on spatial risk layer for UCIB and shows how the landscape of relative risk changes in order understand how changes vary across China.

These relative measures on the level of risk, volatility of relative risk and its dynamic properties across space and time can be used in risk pricing and offer timely measures to understand risk as it emerges from instrument level. Traditionally, economic forecasters and financial analysts have used relative risk as key indicator. Using these tools, the study seeks to extend the analysis to UCIB and broaden the scope of the existing fixed income analysis to capture risks and geographical component of risk to this asset class. The approach seeks to decompose geographical and ‘micro’ aspects of risk which made up relative risk premium. **Our method allows us to** understand the key drivers of relative risks in the context of China’s UCIB and extends such analysis to UCIB as an asset class with over 10 years’ time span, thereby allowing us to reappraise the utility of the UCIB as a tool for risk diversification by local governments as well as investors.

4 The Development of the UCIB and Local Government Debt

The UCIB is one of several forms of infrastructure financing mechanisms in China which belong to a broad category of local government debt or sub-sovereign debt as compared with sovereign debt such as centrally issued Chinese government bond. **UCIBs have existed in**

China for nearly thirty years. In 1992, the central government allowed Shanghai Urban Construction Investment Company to issue 500 million RMB Pudong Construction Bond, China's first UCIB. Since then, UCIB has grown year by year and accelerated into a major asset class for the bank and financial institutions. Despite significant expansion, the distribution of UCIB across China has been very uneven. Top 5 regions such as Jiangsu, Tianjin, Beijing, Zhejiang and Hunan made up a large share of issuance by number and volume. Jiangsu province, by far, has the largest share of issuance and volume. As shown on Table 1, developed eastern region shared 44.3% of total issues and 37.8% of volume, as well as, lower cost of capital such as yield to maturity.

Insert Table 1

In contrast, between 2007 and 2016, the average growth rate increased to 21%. In 19 years (1997-2016) the absolute growth rate increased by 289%. Concerned with the overall level of debt and especially 'covert' debt, the National Audit Office (NAO) launched a nationwide audit in 2011. A new budget law then came into the force in 2015 to regulate local government finance (Bo et al, 2017). Since then, the overall growth of local government debt has been on a path of steep decline from 33% in 2014 to 10% in 2018, correspondingly, the speed of growth for infrastructure has come down as well, from around 25% around 2014 to less than 5% in 2018 (Li and Li, 2019).

By 2015, the Chinese government had decided to put the brake on to deleverage the economy, which resulted in rapid decrease of UCIB issuance. The government policy followed supply side economics was to deleverage the Chinese economy particularly the real estate sector. As a result, the combined leverage ratio for China, measured by total debt to GDP has come down in 2018 (NBS, 2018). Old debts particularly covert type of sub-sovereign-debt (such as UCIB held by LGFP) have been progressively converted (*Zhai Wu Zhi Huan*) into new debt to reduce maturity risk. By 2019, local governments have almost completed the conversion of 16 trillion of old debt (2.37 trillion USD) into new type of debt instrument such as project bond for local government (CCDC, 2016, 2017, 2018, 2019; Liang and Liu, 2019).

Defined by the issuing entity, local government debt can be divided into three broad categories. The first category is local government debt issued directly by the local government

or via the Ministry of Finance. The second category is the loan directly borrowed by the local government. The third category is the local government financing platform (LGFP) or *Chengtou* bond set up by the local government to engage in (1) borrowing via loans from various channels, primarily via commercial banks, (2) issuing UCIB (Urban Construction Investment Bond), (3) financing medium-term notes². Budgetary debt issued by the Ministry of Finance for local government faces hard budget constraint and is considered as an overt form of debt (*Xian Xing Zhai Wu*), whereas the second and third category (LGFP) tend to be extra budgetary, face soft budget constraints and are generally considered as covert debt (*Yin Xing Zhai Wu*). The UCIB is considered to belong to the latter category.

The estimate was rebased using this distinction in Table 2 between Overt and Covert debt (Pei 2009). Overt debt (*Xian Xing Zhai Wu*) is defined by legal contract which clearly states government's liability and can be identified by the budget report. On the other hand, Covert debt (*Yin Xing Zhai Wu*) is extra budgetary and generally considered risky because local government either uses its own credit to provide guarantees or guarantees by collateralising the future revenue or publicly owned land, hence, the government can be held liable in the future. Drawing a line between covert and overt debt creates a false distinction and causes confusion. The line can be drawn many ways by including different types of state-owned enterprises or according to organisational modes with mixed ownership. The distinction is not always clear in the category of covert debt. Our estimate, presented in Table 2, rebased local government debt and national debt taken from various domestic and international sources.

Insert Table 2

From the perspective of the financial market, what matters is whether the entity concerned has debt servicing capacity, in other words, can the future stream of cash flow sustain the future schedule of debt repayment. In this context, the basic valuation matrix on debt by the financial market are time to maturity, duration, yield to maturity and debt service coverage ratio, as will be explained below by applying relative risk framework. From the perspective of investor, the question is whether the UCIB risk premium is appropriately

² Medium-term notes are securities that are offered continuously to investors by an agent of the issuer. They can have short-term or long-term maturities. (CFA Institute, 2019)

benchmarked above equivalent duration sovereign or government bonds and whether the rating accurately reflects the level of risks. In terms of credit, different bonds issued by different local governments come with different ratings which reflect credit-worthiness, liquidity, maturity and yield differences across regions and the state of the local economy. In terms of total risks, the UCIB is generally considered higher risk than government bond but lower risk than corporate bonds, and have higher seniority and less volatility than equity, which in relative terms, can be an asset class of its own.

5 Spatial Distribution of Relative Risks

The relative risk **method** proposed by this paper measures risk premium as the difference between UCIB and the benchmark government bond. **This allows us to model** spatial dimension of risk to reveal the broad pattern of concentration and dispersion, as a financial instrument which strong regional/city characteristics.

Figure 2 **shows** the spatial distribution of UCIB in 2012 and 2016. Four clusters of concentration have begun to emerge in 2012 along China's geographical division centred on tier one cities such as Beijing, Tianjin, Shanghai, Guangzhou and Chongqing. By 2016, UCIB has spread to a large part of middle China such as Hunan, Jiangxi, Hubei and Anhui, as well as, other regions such as Guizhou and Liaoning. A pattern of proximity to the '**first tier cities**' could also be observed. There are some outliers along the border regions. However, over time the centre has shifted to become more evenly spread between eastern and central China with clusters along major centres also become larger.

Insert Figure 2

Figure 3 depicted average yield to maturity in the last 10 years and how relative risk was distributed across China. As can be seen, in the eastern coastal, southern and Beijing areas, the yield to maturity is relatively lower than middle, north-eastern and western regions. The eastern coastal and southern regions have considerably a higher amount of financial capital and more financial instruments. Even though these regions have issued a higher amount of UCIB their relative risks remain lower. This is consistent with the eastern region reporting the lowest yield in Table 3. Relative risk premium explains spatial difference in terms of proximity to financial centres such as Beijing and Shanghai.

Insert Figure 3

The figure shows that the financial market reveals the potential / relative risks of UCIB. In the western and central regions, the relative risks are higher than that in the coastal region. Different risk profiles as explained by relative risk premium also offer investors benefit of spatial **distribution**. An important dimension of UCIB is that it is embedded within a locality and serves as a key linkage between financial capital and the real economy serviced by infrastructure. As yield difference emerges between different localities, capital seeking higher return is driven to the locality with higher relative yield/return, in the process, equalising the yield/return difference between regions.

6 The Asset Class of UCIB and Financialisation

6.1 Creating an asset class

As an asset class, the UCIB is collateralised on real assets and is deemed less risky and more senior than unsecured corporate bonds, and more volatile equity. Commercial banks in China accounted for 80% of investment in primary debt market. Specifically, the share of commercial banks in central and local government bonds were 67% and 87% in 2017. In 2018, key investor in UCIB were commercial banks (70%), the policy banks (26%) and the stock exchange (3%) (CCDC, 2018). The holding varied by duration with 90% of one-year local government bond and 80% for bond maturity between 2-10 years owned by commercial bank. The policy banks held about 15% of bond maturing between 3-10 years and non-legal person (e.g. individual) held less than 1%. On the long end, typically 15-30 years, insurance company owned around 30% with the remaining shared by commercial bank (12-32%) and non-legal person (16-55%) (*ibid*). Stable yield, different maturities and risk profiles associated with UCIB allow Chinese financial institutions to engage in maturity transformation through exposure to UCIB as an asset class.

Other than the asset holding reason identified above, the dominance of commercial bank in UCIB financing needs to be understood in the context of the policy burden of credit support to the state sector in the context of soft budget constraints (Lin and Li, 2004). However, the government reserves the power to strategically renegotiate the terms as recent example

showed 16 trillion RMB of UCIB (2.37 trillion USD) were rolled over and reorganised into project or special bond with longer maturity. Debt conversion is seen as a strategic response by the state to three major issues facing the UCIB. First, between 2005 and 2017, local government financing platform (LGFP)'s average return on equity (ROE) or cost of equity has been consistently below that of other non-financial entity. In 2017, ROE for UCIB was 2.4%, for other non-financial entity, ROE was 6.4%. Second, debt service coverage ratio (DSCR)³ – has been trending downward from 2005 and fell below one since 2010. In 2017, DSCR was 0.4, which meant operating earnings/cash flow was only 40% of current debt obligation. Third, maturity mismatching occurred as average time to maturity was 2.9 years for debt held by LGFP between 2005 and 2017, which meant infrastructure projects with longer horizon of completion are likely to run into difficult with liquidity to service the debt early (Liang and Liu, 2019). UCIB debt restructuring under the strategic guidance of the central government, in effect, reduces maturity risk by prolonging the repayment period and made the asset more accountable with its transformation to new type of project bond.

A secondary market for bond is yet to mature but the private sector has already entered the predominantly inter-bank market for UCIB. The liquidity, although thin, is a trade-off with stable yields for this asset class. Overtime, private sector participation in this asset class has given a popular name to UCIB as 'silver gilded bond' (*Yin Bian Zhai*). Following recent UCIB debt restructuring, major banking institution such as the Bank of China (BOC) became the first to offer over-the-counter (OTC) service to retail investors (BOC, 2019). The first OTC BOC subscription for RMB 100 million Beijing social housing UCIB was sold out within 3 days of issuance by the Beijing branch of BOC. Agriculture Bank of China (ABC) and Industrial and Commercial Bank of China (ICBC) each obtained RMB 5.6 billion of total subscription for OTC sales and accounted for 56% of RMB 20 billion Beijing social housing project UCIB issuance (Beijing News, 2019). Private capital participation also increased with increasing demand from private equity. The underwriting of RMB 2 billion social housing UCIB with 7 years of time to maturity would be appraised by 9 government regulations. The expectation is full interest coverage by project revenue and implicit understanding of 8% Internal Rate of Return (IRR) or the total cost of capital.

³ Debt Service Coverage Ratio (DSCR) = EBITDA / (debt falling due in one year + interest expense). EBITDA is operating income. DSCR is a measure of the cash flow available to pay current debt obligations.

6.2 Using UCIB to raise infrastructure finance

The development of UCIB has sped up the pace of financialisation of China's financial systems. UCIB plays a strategically important, yet constantly evolving role in capitalising and intermediating China's infrastructure investment since 2008. At the start of global financial crisis, China has followed an old fashion approach to engineer infrastructure-led growth and uses the financial systems to serve the real economy. Since 2012, profound internal structural change has produced dynamics which limits the detrimental effect of debt as China's policy swings towards supply side economics.

Now returning to the example used in Section 3, AA+ rated, *16 Jiang Ning UCIB* to show that UCIB has become an effective method to mobilise infrastructure finance. The bond was issued in 10 November 2016 to be retired in 11 November 2023 (7 years' Time to Maturity from first issue). On 21 August 2019, the bond was trading at a discounted price of 99.217 (red line) RMB with a coupon rate of 3.48%. Yield to maturity was 3.681% (green line). On the same day, the yield of 10 years government bond was 2.82%. The difference between the two was 0.86% (86 basis point) - the relative risk premium for holding *16 Jiang Ning UCIB* as compare with holding a 'risk free' 10 year's government bonds. Compared with sample benchmark such as equivalent duration AA+ rated, 3 years UCIB benchmark provided in Table 4, the average value of yield to maturity is 4.91%. *16 Jiang Ning* achieved lower yield/risk level than the average benchmark of same maturity government bond (3.68% compared with 4.91% = 1.23% or 123 basis point), a signal for lower default risk compared with the average of AA+ rated 3 years UCIB benchmark and holding time to maturity constant. In relative terms, *16 Jiang Ning* also has lower relative risk/spread (0.86% or 86 basis point) compared with 3 years UCIB benchmark's relative risk (4.91% - 3.54% = 1.37%, 137 basis point).

Insert Table 3

The issuer of *16 Jiang Ning UCIB* is Jiang Ning City Construction Company Limited, a LGFP located in Jiang Ning district of Nanjing, the capital of Jiangsu province. As shown in Table 5, the issuer has issued six UCIB since 2015 and achieved a good long-term credit rating of AA+ by China Chengxin Credit Rating Group, a key rating agency in China. A variety of debts were raised through corporate bond issue in the inter-bank securities market, private

equity bond traded in Shanghai Stock Exchange, and PPN (private placement notes) targeting institutional investors in the inter-bank market. The average volume of capital raised was about 1 billion RMB with average duration 4.67 years and average coupon rate of 4.12%. The company has been able to tap into capital market every few (1-3) months and successfully raised 6.2 billion from capital market between November 2015 and November 2016.

Our example, *16 Jiang Ning UCIB* belongs to a series of three 900 million RMB issuance in 2016. Industrial securities Co. Ltd. was the lead underwriter for the first issue using the private equity method resulting in 4.60% coupon rate. By second issue, the company has been able to use another lead underwriter GF securities using private equity method and reduced coupon to 3.59%. By the third issue (*16 Jiang Ning UCIB*), the company further reduced coupon to 3.48% using corporate bond method and Industrial Securities for the second time as lead underwriter. ‘Piggy backing’ on the success of its last five issues between November 2015 and November 2016, the coupon rate was reduced from 5.36% to 3.48% with maturity extended from 3 to 7 years. Compared with UCIB benchmark rate of 4.91%, the first issue has much higher rate (5.36%) but by the second issue, the rate was reduced to less than UCIB benchmark. A well-developed, competitive capital market plays a crucial role for the company’s successful debt financing. Through several rounds of financing, the company has also been able to price in its relative risk in each round by shopping around for different lead underwriter and sending signal to the capital market on its long-term credibility. This kind of flexibility is otherwise unavailable in local government debt markets.

Despite various problems and risks, the UCIB has emerged as an asset class in China’s financial market with increasing private sector participation, thanks to the strategic role of the state in timing the investment during the financial crisis and proactively regulating UCIB for a soft landing, through debt restructuring, and creating an active, increasingly private sector driven, secondary market for the UCIB which should serve to reduce the policy burden on the commercial banking sector.

In this context, the research in this paper aims to provide the background to understand ‘micro’ level dynamics of this important asset class in China’s financial market and offers some utilities. Firstly, the tool enables asset managers, institutions and academics to understand the framework of relative risk analysis as applied to UCIB. Secondly, instead of assessing ‘macro’

level of absolute risk, policy maker can use the framework of relative risk analysis to investigate the dynamic properties of risk and risk pricing mechanism through interaction with the capital market. Both are important considerations to develop a ‘micro’ foundation for analysis UCIB risk. In this regard, our research differs from the existing approach on China’s UCIB which tends to focus on absolute measure of risks such as stock and flow and exploring aggregate impacts of a broad set of largely, macroeconomic variables (Pan et al, 2017).

7 Conclusion

The UCIB is an emergent asset class which provides flexible financing to local government and attractive risk-adjusted returns to investors. It has sped up the financialisation of China’s infrastructure finance and plays a strategically important role in terms of strong inter-bank financing of the infrastructure sector. Faced with the global financial crisis, China developed the infrastructure sector needed for further urbanisation. The existing literature has understated the full potential and contribution of infrastructure as an asset class to China’s financial system and to the world economy. We argue that UCIB is fast emerging as an asset class which despite being owned in majority by the bank is nevertheless attracting private capital for financing. As an asset class, the UCIB has seen spatial distribution of different risks. The UCIB is embedded within a locality and serves as a key linkage between financial capital and the real economy serviced by infrastructure. As yield differences emerge between different localities, capital seeking higher return will be driven to the locality with higher relative yield/return, in the process, equalising the yield/return difference between regions.

This paper uses a relative risk framework to reveal different risks associated with UCIBs. By elaborating ‘micro’ level dynamics of pricing and spatial differences, we are able to demonstrate the risks associated with UCIBs such as geographical component and capital market interaction. the existing studies might have made policy maker overstated the risk associated with UCIB and understated the full potential and contribution of UCIB as a financial tool for local government. The paper illustrates the importance of understanding different ‘micro’ layers of relative risks which made up idiosyncratic aspect of UCIB risks. Using specific example of UCIB we assess the pricing of relative risk and show how the capital market facilitates the financing of UCIB through signalling and repeated interactions. The future of UCIB depends on its potential as an asset class which bridges the linkage between

China's real economy and financialisation. The continuous development of capital markets particularly primary and secondary market, and the demand for UCIB through different methods of issuance and securitisation offer investment opportunity which could help to provide China's long-term future.

Due to the limitation on the length of this article, we have not been able to demonstrate a full model that examines a whole spectrum of 'micro' level relative risk factors and further decompose their interactions. It is also not possible to model the interactions between UCIB and other asset classes, e.g. equities and central government bond. The latter would help to inform financial policy aims at financial contagion, at a time of crisis. This can be the direction of future work using large-scale vector auto-regression model (VAR) to fully decompose UCIB relative risk into finer granularity. The dynamic relationships between UCIB yield, government bond, equities and other asset classes can be estimated and modelled to demonstrate how financial instrument changes in respond to shock. This paper, by considering the spatial dimension of relative risk limits the decomposition to the idiosyncrasies associated with spatial layer of relative risk and using case study illustrates the pricing dynamics of risk by capital market. On policy side, understanding the volatilities of UCIB relative risk is critical to understand the path of contagion across asset classes, and the magnitude of risk transmission, therefore offers utilities for policy makers who are facing their 'Minsky' moment of asset price collapse and multiple asset class contagion during crisis. The view is based on a 'micro' level instrumental understanding of UCIB as a financial instrument and the information contained. Such 'micro' level understanding should be extended further to include more studies that examine how such instrument changes in respond to exogenous shocks and what it implies for understanding the business cycle.

By focusing on the relative risks, this paper does not suggest that UCIBs have already become a viable market-based asset class. There are problems associated with the overall risk of infrastructure investment, local government debt, and macroeconomic conditions. The local financial market is still affected by many issues such as financial irregularities. The credit rating of UCIB issuance is still not entirely transparent. However, it is hoped that along with the development of the secondary market UCIBs would begin to reveal relative risks for investors to choose. The relative risks revealed by UCIB may also impose a constraint on risky UCIBs as the latter would demand a higher premium.

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