An Analysis of China's Reforms on Mortgaging and Transacting Rural Land Use Rights and Entrepreneurial Activity

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Abstract:

This paper aims to determine, how providing the right of collateral to LUR might change farmers' investment behavior and incentivize entrepreneurial activity. To achieve this objective, we try to solve two issues. The first issue of economic importance is in understanding the market value of LUR transactions; creating now a tradable asset from one which held value but no market. To examine this we build an argument around the idea of economic and marginal rents from Ricardo. The second issue relates to the extent by which deepening the rural financial landscape by allowing the mortgaging of LUR will promote and advance much needed entrepreneurial activity. To explore this issue we draw on Schumpeter. Then, based on a survey of 1,465 farm households in rural China and an endogenous 2SLS model. We find that a positive and significant relationship between a willingness to mortgage LUR and entrepreneurship, which suggest that the new policy may well meet that objective. However, we do not find that that entrepreneurs alone will have a willingness to mortgage LUR; non-entrepreneurs – traditional farmer types- would also be willing to mortgage LUR, but with a caveat that either group already has a disposition or demand for credit.

JEL Codes: M13, R22

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Keywords: Land Use Rights, Entrepreneurship, Economic Rents, Mortgage, Farm Household

JEL codes: M13; Q15; R22

1. Introduction

A substantial body of research has indicated that many farmers in China face considerable constraints on access to credit, and that a significant source of these constraints lies in the ubiquitous policy of land use rights (LUR). The usufruct nature of LUR created an inability to transact and without the typical ownership rights of most other developing or developed nations the old policy had stymied progress in attaining economic efficiencies of scale, size and scope, and the ability to borrow against the land to advance more entrepreneurial activities[1]. To address

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[1]Restrictions and ill-defined property rights not only resulted in prolonged, poverty-inducing, inefficiencies in agricultural productivity, but also established liquidity constraints that discouraged investment and entrepreneurship

these issues China's land policy towards agricultural and rural development has gone through

significant transformations in the past 10 years with the intentions of bolstering farm incomes,

facilitating urbanization, encouraging rural development through small and medium enterprises

(SME) and the encouragement of innovation and entrepreneurship. Although there are many

economic models and paradigms relating entrepreneurship to with economic growth, what

China seems to seek is largely Schumpeterian in scope. Schumpeter (1947) argues that

economic development is driven by adaptive responses to macro-driven factors such as

population and global growth, and creative responses which arise largely independently of these

to do or create something that is outside of the conventional range of existing practice[2]. By

inference the new supply functions amount to shifts, not along the production function, but to

the production function at both the extensive and intensive margins[3]. Earlier, Schumpeter (1928)

explicitly linked the role of credit markets to innovation and entrepreneurship[4]. What

Schumpeter is suggesting is that reliance on savings and retained earnings can do little more

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in rural areas (Yang and Wu, 1996; Zhang, 1997; Zhao et al., 1998;Ding, 2003;Weber & Key, 2015). Feder (1988), Eggertsson (1990), Besley (1995), Alston et al. (1996), Feder & Nishio (1999),Marsh et al.(2006), Deininger and Jin(2009), Ma et al. (2015) have argued that land property-right institutions and land registration is the basis for improved tenure security, economic behavioral changes, land productivity improvement, access to formal credit, developing markets and encouraging long-term investment. In the Chinese context Khantachavana, et al.(2013) point out that a market for mortgaging LUR, if developed, would   provide farmers with access to credit markets, stimulate investment and improve operational performance and productivity, while enabling farmers to reallocate resources and responded to the changing Chinese economy.

[2]On innovation Schumpeter writes "*it is by means of new combinations of existing factors of production embodied in new plants, and typically, new firms producing either new commodities, or by new, i.e. as yet untried, method, or for a new market, or by buying means of production in a new market… (Innovation) means producing at smaller cost per unit, breaking off the old 'supply schedule' and starting on a new one. It is quite immaterial whether this is done by making use of a new invention or not*" (1928, pages 377-378; see also Schumpeter, 1947; the defining characteristic of entrepreneurship "*is simply doing of new things or the doing of things that are already being done in a new way (innovation).*" Page 151).

[3]The terms 'extensive margin' and 'intensive margin' as coined by Haney (1910) based on the distinctions in the meanings by Hollander(1895)for extensive versus intensive cultivation of agricultural lands. The rents from intensive cultivation arose from the intensification of production on the same use of land, while extensive cultivation drew from increasing output on the next unit of barren land. Haney argued that the economic rents at the extensive margin arose from allocating resources on the next unit of land not only in the same-use (e.g. agriculture) but also alternative uses (e.g. residential buildings, factories and storage etc.).

[4]Writing "*This process of innovation in industry by the agency of entrepreneurs supplies the key to all the phenomena of capital and credit. The role of credit would be technical and a subordinate one in the sense that everything fundamental about the economic process could be explained in terms of goods, if industry grew by small steps along coherent curves. For in that case financing could and would be done substantially by means of the current gross revenue, and only small discrepancies would need to be smoothed*" (Schumpeter, 1928).

than maintain investment at the intensive margin. To drive innovation – investment at the extensive margin – there is a need for a parallel effort at credit-creation which, "*becomes an essential part both of the mechanism of the process and of the theory explaining it. ... Credit-creation is the method by which the putting to new uses of existing means of production is brought about through a rise in price enforcing the 'saving' of the necessary amount of them out of the uses they hitherto served"* (Schumpeter, 1928, 381-382). Perhaps the most significant changes to policy is the recognition that savings alone is inadequate to meet the financial needs of Chinese farmers. The recent moves reduce or remove liquidity and credit constraints by permitting not only a broader range of transactions in land amongst farmers through formal rent agreements, but also credit-creation by allowing farmers to mortgage loans against the collateral value of LUR.

The new land policies are important and historically transformative changes that need to be addressed within the context of China's agricultural economy, credit markets, and labor force. On this last issue a balance must be struck on the rate at which farmers leave agriculture and the development of that same population's ability to be absorbed into the non-farm economy as wage laborers or entrepreneurs. Since entrepreneurial activity is a political driver of the new land use policies it is important to come to some understanding of the degree to which transacting and mortgaging LUR will translate into entrepreneurial activities. The overall objective and ultimate focus of this paper is to determine, at least preliminarily, how providing the right of collateral to LUR might change farmers' investment behavior and incentivize entrepreneurial activity. To achieve this objective however, we must also come to some understanding of the historical significance of LUR, the economic interpretation of LUR in

terms of economic rents, and how LUR are valued for the purpose of mortgaging. Further, we have to come to some understanding in regards to the additional sources of liquidity from land transactions and mortgaging, and entrepreneurial activity. Thus, this paper contributes to the existing literature in several important ways. First, in the sections that follow, we examine the economic value of LUR through the economic lens of Ricardian rents at the intensive and extensive margins. From this base we can assess how changes in land use policy can alter or impact the economic value of LUR. Second, we address the collateral value of LUR for obtaining loans or LUR mortgages and provide some theoretical representations of the Ricardian model with credit availability to identify the conditions under which farmers might remain in farming, expand farming activities, become entrepreneurs or enter the labor force. Finally, because the creation of new business through entrepreneurial ability is a crucial objective of China's new land use policies, we explore, using a survey of 1,465 farm households in Gansu, Henan, Shandong and Shaanxi provinces, how the mortgaging of LUR might encourage the innovation and entrepreneurship in rural areas that the Chinese government seeks. The paper proceeds next with a review of LUR policy in China, and the evolution of new LUR transactions and mortgage policies. The paper then discusses the economic considerations and consequences of the new policies, particularly on valuation, credit and entrepreneurship. Eventually, the empirical contribution focusing on the relationship between entrepreneurial activity and LUR mortgage is presented, and the paper is concluded.

2. Background to Land Use Rights in China

The current structure of LUR in China was a first step in the decollectivization of Chinese agriculture. The years from 1979 to 1983, saw the implementation of *bao gan dao hu*, the

Household Responsibility System (HRS) which separated land contractual management rights from the land ownership. By providing individual decision making rights and market incentives (i.e. Subsidies) the intent of HRS was to provide scope for independent decisions making, and negotiations rather than central fiat (Wiens, 1988). The second stage followed from China's No.1 central policy in 1984 which fixed the terms of land contracting management with the collective economic organization for 15 years. 1984 also saw the enlargement in the scope of private activities including procurement, marketing and transport of agricultural products as well as encouraging (mostly joint) investment in capital goods such as trucks and tractors (Wiens, 1988). In 1993, the China 11th document, the Land Law in 1998 and the Land Contracting Law in 2003 extended this by another 30 years with expiration and re-evaluation in 2028. In 2008 the government stipulated that the current contracting relationship will remain stable and unchanged for a long time, but the specifics have yet to be clarified except that the *Property Law* in 2007 stipulated that land contractual management rights will remain as traditional usufruct rights.

But the 2007 law did make one significant break from custom in formalizing the separation of land contracting right and land user rights from ownership in order to meet a huge need of land transfer for farmers. Prior to 2007 LUR granted to farmers were not separable from land ownership (by the state) and transactions between LUR were prohibited by law (Ding,2003). Although informal transactions and transfers were not uncommon in China, it was done either secretly or with approval from village leaders and councils on an ad hoc basis (Khantachavana, et al., 2013 and references therein). Otherwise the lack of administrative channels for the transfer of LUR and ill-defined property rights resulted in land-use deficiencies, social conflicts

and land disputes (Ding,2003). The new provision concerning the *Guiding of rural land management rights transfer with moderate development of agricultural scale operation* in 2014 took the forward step of decoupling who cultivated the land from the registered owner of the LUR, with political discussions and some experiments on the mortgaging of the LUR. The significance of decoupling production rights to the LUR itself was a significant move in terms of economies of size and economic growth at the extensive margin. With transactionable land farmers could legally transfer or rent their LUR to a third organization or through a Land Bank. The next step in farmland policy reform was a property-based land user rights mortgage system issued by the Central Committee and State Council in November 2014[5].

3. Reforming the Land Use Rights Model 2007-2015

Since 2007 certain allowances have been made to add flexibility in transacting and mortgaging LUR. This is owing to the issuance of *Property Law* in 2007 which provided a property base for LUR through a national registry. This was followed by policies concerning the *Financial Advancement of Economy Development* in 2008 to encourage financial institutions to expand the scope of rural collateral and explore various credit products. These policies differ dramatically from previous reforms in that they were geared towards economic development at the extensive margin, rather than increased productivity and scale at the intensive margins. By targeting the extensive margin with allowances for longer-term mortgageable credit the intent was to increase absorption of rural labor supply in the urbanization process, while improving rural investment, GDP, and rural-urban inequality. Whether or not allowing LUR to be transacted or mortgaged will have the desired effect remains to be seen. In terms of transacting

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[5] http://news.xinhuanet.com/politics/2014-11/20/c_1113339197.html Xinhua News

findings by Khantachavana et al.(2012) find a fairly significant spread between the willingness to sell and buy prices of transactable land, suggesting that many farmers will need significant economic incentives to transfer their rights

The provisions to enable farm households to mortgage LUR in some locations was issued by the Central People's Bank and China Banking Regulatory Commission on March 18 2009 .The clear intention was not only to improve the scale of existing operations, but by linking LUR to longer term credit the broader effort was aimed at farm commercialization, and advancing entrepreneurial activity. Subsequently, China's first policy documents for 2014 and 2015, - the No.1 central policy- allowed farmers to mortgage LUR in certain locations and under certain conditions. On August 10 2015, the document concerning *the trial implementation of rural management rights over contracted land and farmer's homes as collateral for bank loans* was approved by the State Council confirming that Chinese farmers would be allowed to transfer LUR and use LUR and homes to raise mortgages[6], in addition to converting LUR into shares in large-scale farming entities[7]. In some regions uptake was swift. Between 2008 and 2015 the LUR registration program exceeded 33,000,000 Mu (4,925,373 acres), expanded to more than 1,988 counties including 130,000 towns (accounting for 40% of all the towns in China), 195,000 villages (about/approximate 1/3rd of all villages in China) and arable land was completed the issuing of land-use certificates[8] with the registration program to be completed by 2018[9].

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[6] http://news.cnstock.com/industry/sid_zxk/201508/3542345.html

[7] http://english.agri.gov.cn/news/dqnf/201403/t20140307_21350.html

[8] http://news.xinmin.cn/domestic/2015/02/27/26913706.html

[9] http://english.agri.gov.cn/news/dqnf/201312/t20131226_20926.html   Xinhua News, Beijing

4. Land Banks and Land Transfer Centers

To complement the overall policy pilot programs, starting in 2007, have emerged with comprehensive property rights trading centers known as Land Banks and Land Transfer Centers[10]. The land banks, which are not banks at all in the traditional sense, take their name from farmers 'lending' their LUR to the banks, with the counterparty 'borrowing' the land. These are pure, contractual rental agreements that consolidate rental contracts from farmers who are issued contracts of at least 5 years in duration and longer. On the other hand several 'land Bank' pilot projects in Shaanxi, Henan, Ningxia, Hubei, Jilin, Heilongjiang have established intermediaries that will 'rent' the small holding of many farmers in a village and rent out larger parcels to more commercial operations. In Shaanxi the Yangling Land Transfer Service center (Land Bank) has transformed nearly 55,000 mu, from (from perhaps 10,000-12,000 farm families) receiving a rent of 770 CNY/mu from double-crop corn and wheat to kiwi and other high-value crops. The land bank charges about 1,000 CNY, or about 30% higher to renting enterprises, which the time of writing was a kiwi company[11]. Of this 30%, 10% is returned to farmers as a 'dividend' with the remaining 20% placed in a risk fund. In Henan the Land Bank of Linying County, nearly 180,000 mu planted primarily to double-crop corn and wheat has been rented from farm households and rented out in 100 mu lots for same-purpose agriculture but with higher, near commercial, efficiency gains. LUR in Henan rent for about 950-975 CNY/mu/year and are rented out at about 1,050 CNY/mu/year[12].

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[10] The official name is Rural Land Transfer Service or *Nong Cun Tu Di Jiao Yi Zhong Xin* .We use the term Land Bank (*Tu Di Yin Hang*) because in both Shaanxi and Henan the managers used this term, perhaps derived from European and American use of the term.

[11] The 30% top-up was instituted in 2014 and since then only 5000 mu has been rented out. Prior to 2014 the land bank rented out at the same rate it paid farmers. We do not know at this time whether the (seemingly) lower turnover since 2014 is due to the price increase, but if so this would indicate that the LUR rental market is quite elastic.

[12] Our interest is primarily confined to rural areas. For urban effects see Chau & Zhang (2011) who report that in

From our survey we asked (by recall) farmers to indicate gross revenues and costs of production for their agricultural activities. In Baoji City area of Shaanxi and in Henan most of the agricultural land is double cropped corn and wheat and on average the status quo economic rents were 489 CNY/mu ($465/acre) in both regions. In considering these number we need to keep in mind that both wheat and corn (and not soybeans which is likely why so little soybeans is grown in this region) has a reservation price of 150 CNY/50kg[13]. For wheat the equivalent in USA dollars (@6.3 CNY/$) is about $12.90/bu. and for corn $12.04/bu.[14]. These are among the highest reservation prices in the world and offers substantial subsidies which is why $447/acre (double cropped wheat and corn) is not unreasonable. (Corn as at 11/20 was $3.63/bu. and wheat was at $4.87/bu.).

If we capitalize the rents at a typical RCC interest rate of 6.5% in perpetuity the fundamental value of the LUR at its current scale of production is 8,150 CNY/mu (about $7,761/acre). However in actuality the Shaanxi offer rate to rent land is (in 2015) was 770 CNY/ mu resulting in a value of 11,846 CNY/mu of assessed value in the next best alternative (amounting to $11,282/acre) and in Henan 950 CNY/mu gives a LUR value of 14,615 CNY/mu ($13,919/acre).

Shaanxi net revenues for government leases yield on average about 4,962 CNY/mu per year from government land leases. This is equivalent to about $4,725/acre and if discounted as a perpetuity using a lending rate of 6.5% puts a value of the LUR on the urban fringe at about $72,704/acre.

[13] The reservation price is a de facto price floor. If the price received by farmers is less than the reservation price the government will purchase the grain from the farmers and hold the grain in storage. Farmers receive a subsidy for the difference. The policy is essentially a high valued put option with a price strike equal to the reservation price. The intrinsic value of this option as at the time of writing was equivalent to $8.03/bu. for wheat and $8.41/bu. for corn. By Chinese law, grain purchased by the government cannot be sold into the market for less than its reservation price, and since prices in wheat and corn have come nowhere near the reservation prices grain storage is considerable, and farmers are immunized against market price volatility. Of great concern is that the only justification for such high rents, as discussed in the text, is that the economic rents from which LUR and ultimately farm loans/mortgages are calculated assumes that this level of support will remain in the long run. China entered the WTO in 2001, and may feel pressures to reduce farm subsidies. However, since the Chinese government does not release grains at current world prices there is little pressure for exporting countries to challenge the policy since the withdrawal of domestic supply actually increases imports to meet domestic demand. However, as farm size becomes more commercial, the Chinese government may face lower domestic pressures to support agriculture and any reduction in reservation prices will no doubt reduce the Ricardian value of LUR and the supported credit value, putting the loan to value at risk.

[14] These assume 2.204 lbs. /kg and 60 lbs. /bu. For wheat and 56 lbs. /bu. for corn. We use a currency conversion of 6.3 CNY/$.

In Shaanxi the corn/wheat land is almost exclusively put to new-use in Kiwi.

The credit problems faced by farm households are well known and it is anticipated that registering, allowing transactions, and mortgaging of LUR will relax credit constraints and reduce credit rationing to Chinese farmers. Credit is important. For instance, in China, there are 250-300 million farmers that contribute to rural economy, only 1.7 million of them can get the benefit from the guarantee loan (Huang, 2009). Han (2008) and Mao et al. (2014) point out that credit constraints in rural China are still serious, and even though many Chinese farmers have moderately inelastic to elastic demand for credit (Turvey, et al.,2012) many farmers still rely on informal loans (Turvey and Kong, 2010; Turvey et al.,2010;2011). Wang et al. (2003) found that 83.4 percentage of farmers agreed that capital shortage is the primary and critical factor affecting their entrepreneurship. As Danes et al. (2009) found that most of farmers with an interest in entrepreneurial activity cannot do so because they lack venture capital; only 10 percent of entrepreneurial capital in China is from formal financial institutions(Hao et al., 2012). In the absence of real collateral, formal lenders tend to be more prudent and cautious when supplying loans to farmers, due to the shortages of effective guarantees, high transaction costs, risk, and higher monitoring cost (Wu and Yu, 2015). In 2013, farmers in Jilin province could only obtain about 30 percent of their financial needs, with about 80 billion yuan ($13 billion) in excess demand[15].

LUR registration paves the way for land transfer programs, but the mortgaging of LUR is still (at the time of writing in 2015) restricted to a limited number of regions (33) involving more

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[15] Data stems from website: "http://www.agri.gov.cn/qxny/nqyw/201503/t20150326_4459038.html" (China daily, 2015-03-26).

than 18 counties in 12 provinces as approved by the Ministry of Agriculture.[16] How lenders

will ultimately respond to the new land policy of mortgaging LUR is, by our own investigation

tepid but at present the Agricultural Bank of China (ABC), China Postal Savings Bank (CPSB)

and some commercial banks have defined strategies to develop the business around LUR

mortgages[17]. State banks such as ICBC (Industrial and Commercial Bank of China), CCB

(China Construction Bank) and CDB (China Development Bank) are also planning to support

rural LUR mortgages.[18]

To get around the problem of using LUR as collateral for a mortgage, the Land Banks can

monetize the rental contract and lend money to farmers who wish to start new enterprises in

local or distant urban regions. To facilitate mortgaging of LUR the government has authorized

and organized a formal registry that identifies the rights held by each household and its

members. Under the current model farmers can borrow up to 70% of the value of LUR (plus an

adjustment for non-moveable ground attachments such as irrigation), but how these LUR are

valued in the market has not been presented in detail and (by our observations and interviews)

will differ by locality. However, using conventional bid-price approaches to LUR valuation,

assuming a 6.5% interest rate and that 70% of the 770 CNY/mu rental agreement can be used

for credit, the maximum loan value requiring minimally interest payment would be 11,846

CNY/mu. Our results from Shaanxi show that there are on average 4.79 mu/household and

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[16] Since 2009 LUR mortgage program are active in Zhejiang, Jiangsu, Henan, Anhui, Jilin, Hubei, and some other provinces like Shanxi, Shandong, Hunan, Gansu, Heilongjiang, Jiangxi, Jilin.
 http://news.dichan.sina.com.cn/2014/09/02/1202826_all.html
[17] See, for example, the ABC report *management approach of rural land contractual management right* in August 2014, which provides the basic rules for mortgaging LUR. Mortgageable LUR include legally contracted barren hills, waste valleys, barren hillocks, desolated beaches, desert land, farmland and other land via retransfer, lease, and swap as well as the facilities on the ground, with a maximum of 10 million CNY per farm household. Loans with flexible terms, collateral-rates, and reimbursements will be purposed to support the liquidity needs of the planting/harvesting cycle to promote agricultural productivity. http://news.xinhuanet.com/fortune/2014-08/21/c_126901136.html Xinhua News
[18] http://news.dichan.sina.com.cn/2014/09/02/1202826_all.html

despite the fact that LUR are allocated at the individual (rather than household) level, our conversations indicate that in the vast majority of cases the rental contracts absorb all LUR held by household members. Thus the Land Bank potential in new loans for a household to start a new business is about 56,743 CNY/HH ($9,007) plus any savings that the household might be able to contribute. By Chinese standards this can be a substantial resource for new non-agricultural investments at the extensive margin.

5. Creative Destruction and Land Use Rights Reform

Schumpeter's view on innovation was that "*Innovations are changes in production functions which cannot be decomposed into infinitesimal steps*" (Schumpeter, 1935, page 4)[19]. The idea here is that innovation in production is discontinuous at various points as one reality of innovation in the past is replaced with one that is new and more than simply a change at the intensive margin. Discontinuities in the production function arise from irreversible fixities in the state of technology or the state of production that brings about an entirely new production function. If this production function were viewed across time it would appear to have jumps, but these are really only phase transitions from one set of technologies to another, in what modern econometricians might call structural breaks. These structural breaks arise periodically as a natural evolutionary form of creative destruction. The Schumpeter (1934; 1942) view is that new independent firms form which leads to creative destruction and the formation of new

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[19] But what expresses entrepreneurship is not, as Spencer et al. (2008) point out settled in meaning. Kirzner (1973; 1997) looked at the entrepreneur as an exploiter of opportunities that are exogenously determined, emphasizing opportunity recognition with a special ability to manage and cope with risk. The entrepreneur does not innovate per se but seeks out value opportunities in the market place to exploit. Information widely dispersed and absorbed by many will be commoditized rapidly, but information that is rare or unrecognized as having value allows for innovations that provide, at least for some time period, monopolistic or some other form of market power. Other definitions of entrepreneurship reviewed in Spencer et al. (2008) include Shane and Venkataraman (2000) who argue the same as we do that entrepreneurship does not require the formation of a new firm. Wennekers and Thurik (1999) argue the same but include uncertainty, while Baumol (1993)refers to entrepreneurs as individuals who locate non-routine, new ideas and act upon them under uncertainty.

firms that operated alongside the old. This may be true if the new innovation is not easily imitable because this brings about an initial advantage in market power. This may not be true of atomistic farm firms that do not compete with each other directly but compete with the aggregated commodity market as a whole of which none have any control. To these, entrepreneurial activity is a consequence of innovation, and by innovation is some change at the extensive margin which could arise from changes in management practices or applying new technologies such as is observed in Shaanxi with the conversion of corn/wheat land to kiwi.

The sense of creative destruction by Schumpeter is that old industries evolve into new industries by consuming the old. This is traditionally the work of the capitalist and/or entrepreneurs, or at any rate by individuals and by their own initiative. But, because the LUR system in China was promulgated by the state, there was little for the farmer to create or destroy because of the constraints imposed upon him by the law. Creative destruction – at least in our rural Chinese context – can only be by government design and at the whim of the state[20]. What is being destroyed is not a particular product or technology but a political contract between the farmer and the state that decoupled production from land ownership depriving the farmer of fundamental value. Now, the policy couples production with ownership in a 'right' that with unbound constraints on transactability provides a new residual market value to the farmer.

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[20] The idea of creative destruction in a centrally planned economy is not of the continuous process that Schumpeter describes for a competitive capitalist economy. In these it is assumed that the capitalist economy is in continual motion, a dynamic of changing apparatus and processes with the incessant revolution in economic structure from within, incessantly destroying the old one and incessantly creating a new one (Schumpeter, 1942, pages 82-85). Here we argue that as the old system of LUR is extinguished in light of the new policies on transactions and that the policy itself is one of creative destruction. The economic hopes of transformative change it appears is relying on this. However, evolutionary progress in China is slow and non-adaptive, or slow to adapt in many ways by the sheer vastness of its agricultural economy and rural population yet time and again China's rural economy has radically been transformed through (sometimes not so) creative destruction. But speaking of creative destruction at something higher than the firm does not put us at odds with Schumpeter(1928) in the sense that politically transformative events can change the capitalist *order* and to this change in order arises a new capitalist *system* with different degrees of stability and instability than the one that preceded it. The businessman must replace capital assigned to the old order in favor of new capital aligned with the new order.

If the changes in China are not just transitory, but as we believe fundamental transformations of the agricultural economy and cultural patterns then the new rules to be effective must drive growth not only in the agricultural economy but as a pass through to the general economy through endogenous linkages. As far as the agricultural economy is concerned in prior to 2009 there were economic developments at the intensive margin but as discussed previously these will generally exhaust themselves in a short amount of time. Innovation in a large scale was generally constrained by credit to some, technology to others, and know how in general, but these constraints cannot easily be blamed on the farmer but rather on the state which imposed the household system in the first place and laid claim to all lands. Usufruct rights have their limitations, but by allowing transactions in LUR and mortgaging against the collateral value, frees up what were almost insurmountably binding constraints for the vast majority of farmers. These constraints bound innovation so that growth no longer became a factor; it got caught up in the slack of the system.

6. Ricardian Rents, the Value of Land Use Rights and Mortgage Decisions

We now explore in more depth the meaning and significance of investment at the intensive and extensive margins. We use a Ricardian framework because fundamentally the economic value of LUR are driven by the economic rents that can be obtained as direct or indirect profits on the next best alternative use of the land. We first define the production function in terms of a variable input x and an inventory of moveable capital, k_f, and profit maximizing optimum at y_f^*. With production elasticities γ_x, γ_k, we assume, to start, that in the absence of adequate credit the production response is given by

$$y_f = \alpha \cdot x^{\gamma_x} k_f^{\gamma_k} \tag{1}$$

Which is suboptimal. To achieve optimality the farmer seeks to change the levels of variable and quasi-fixed assets in the following way,

$$y_f^* = y_f + \Delta y_f = \alpha \cdot (x + \Delta x)^{\gamma_x} (k_f + \Delta k_f)^{\gamma_k}, \tag{2}$$

But to do so requires a source of cash equivalent to

$$v_x \Delta x + v_{k_f} \Delta k_f = B \tag{3}$$

Assuming the farmer has some savings, $s \geq 0$ and an interest rate r on both borrowing and lending, the incremental change in profit is

$$\Delta \pi = \Delta y_f + (1+r)(s_0 - B) \geq 0 \tag{4}$$

Which implies a loan requirement of $L = Max(B - s_0, 0)$. Assuming $L > 0$, and there is no quantity rationing, the optimum can be achieved if $r \leq \dfrac{\Delta y_f}{B - s_0} - 1$. Under these conditions access to credit allows for the purchase of inputs to increase the intensity of cultivation in one way or another and the return $\Delta \pi > 0$ is the return to investment at the intensive margin.

At the extensive margin, consider the intercept α which captures the scale of production. This coefficient captures the capability of the farm to achieve scale and size economies from the fixed resources available (e.g. land and non-moveable investment such as irrigation) as well as the ability of the farm to produce. The greater the capability the greater the value of α, and this will likely differ amongst farms, and as will be discussed presently, may have an impact on the transformations taking place in China. We can view investment at the extensive margin a number of ways. First, if we specify

$$\Delta y_f = (\alpha + \Delta \alpha) \cdot x^{\gamma_x} k_f^{\gamma_k} \tag{5}$$

we can describe investment at the extensive margin, while not following through with

investment at the intensive margin. When we specify

$$\Delta y_f = \left(\alpha + \Delta\alpha \right)\left(x + \Delta x \right)^{\gamma_x} \left(k_f + \Delta k_f \right)^{\gamma_k} \tag{6}$$

we are describing simultaneous investments at the extensive margins, but for the same crops.

This is what is observed in Henan province. However, when we specify

$$\Delta y_f = \left(\alpha + \Delta\alpha \right)\left(x + \Delta x \right)^{\left(\gamma_x + \Delta\gamma_x \right)} \left(k_f + \Delta k_f \right)^{\left(\gamma_k + \Delta\gamma_k \right)} \tag{7}$$

We consider not only investment at the intensive and extensive margin, but also investments

that change the very nature of production via changes to the production elasticities. This is

representative of investments that transforms the very nature of production, for example the

exchange of corn and wheat for kiwi as is observed in Shaanxi.

The budget constraint for investments at the extensive and/or intensive margin can be depicted

as

$$v_\alpha \Delta\alpha + v_x \Delta x + v_{k_f} \Delta k_f = B \tag{8}$$

and as before the investment can be made if $\Delta\pi = \Delta y_f + \left(1+r\right)\left(s_0 - B\right) \geq 0$, and the loan

amount $L \geq \dfrac{\Delta y_f}{\left(1+r\right)} \geq L^*$. There is also hope that some farmers will make non-farm

investments at the extensive margin. Assuming that the non-farm investment opportunity is

$y_e = \beta \cdot k_e^{\phi}$, using the same reasoning as above profits are determined by

$$\pi_e = \beta \cdot k_e^{\phi} - \left(1+r\right)\left(s_0 - k_e\right) > \alpha \cdot x^{\gamma_x} k_f^{\gamma_k} + r s_0 \tag{9}$$

which states that if the return from entrepreneurial activity exceeds the status quo, including a

return on savings, the farmer will choose entrepreneurial activity over farming. In comparison

to (4) we assume in (9) that $B = k_e$ where k_e the capital cost of new non-farm investment that

is fully decoupled from the land and LUR.

Lastly the farmer can simply take a wage rate, collect the rent and leave farming altogether. In

Yanling farmers who rented land to kiwi production could also apply for field labor work amounting to about 8-100 CNY/day for women, 100-120 CNY/day for men, and up to 150 CNY/day for intensive field work such as harvesting. The decision to rent is simply that the combined income from land rental plus wage labor exceeds the economic rents from agricultural production.

$$\pi_e = w + R > \alpha \cdot x^{\gamma_x} k_f^{\gamma_k} - v_x x - v_{k_f} k_f \tag{10}$$

Under the new policies in China the loan amount will be determined by the economic value of the LUR. We assume that the value is determined by the Ricardian notion of economic rents- that value is placed on the next best alternative- and to keep the model simple we assume that the value of the LUR is treated as a perpetuity;

$$V = \frac{(\alpha + \Delta\alpha)(x + \Delta x)^{(\gamma_x + \Delta\gamma_x)} (k_f + \Delta k_f)^{(\gamma_k + \Delta\gamma_k)} - \left(v_\alpha \Delta\alpha + v_x (x + \Delta x) + v_{k_f} (k_f + \Delta k_f)\right)}{r} \tag{11}$$

and $L \leq \delta V$. Under the current policy bankers can lend up to 70% of the value of the LUR, i.e. $\delta_{max} = 0.70$, but this is guidance and not mandatory. Nonetheless, if $L = \delta V \geq \dfrac{\Delta y_f}{(1+r)}$ then the target production at the intensive and/or extensive margins can be achieved, but if $\dfrac{\Delta y_f}{(1+r)} > \delta V$, the scale of investment will be credit constrained, but so long as $\delta > 0$, at least some improvements can be achieved over the status quo.

How important are these considerations of entrepreneurial activity and liquidity constraints[21]?

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[21] The nature of this question deals only with first order stochastic dominance with more being preferred to less. For space considerations we have excluded a broader discussion of risk. This could have been accomplished by restating the farm and entrepreneurial response functions as $y_f = \alpha \cdot x^{\gamma_x} k_f^{\gamma_k} \varepsilon_f$, $y_e = \beta \cdot k_e^{\phi} \varepsilon_e$ with the multiplicative error terms added, and (as in Evans and Jovanovic (1989) independent and identically distributed Productivity shocks of $E[\varepsilon] = 1, E[\log(\varepsilon)] = -\frac{1}{2}\sigma_\varepsilon^2$ clearly a complete discussion of the relationships between LUR and

When our survey respondents in Gansu, Henan, Shaanxi and Shandong were asked if credit constraints were relaxed with transacting LUR, only 20.40% of indicated that they would remain in agriculture, (either at Equations 1, 2, 6 or 8 depending on whether they do nothing, invest at the intensive margin or at both the intensive and extensive margins) but only 11.63% indicated that they would start a new business (Eq. 9)[22]. Other farmers might simply leave agriculture, collect the rent, and seek wage employment (Eq. 10). Of farmers who indicated a desire to start a new business, In terms of farming at the extensive margin 35.6% and 38.3% indicated a desire to remain and expand livestock and crop farming respectively as their top 3 choices, with 18.3% and 16,5% indicating these as the first choice. This may be aspirational; of those that had started a new business only 4.9% and 11.9% actually invested in expanded breeding and crop production. Only 8.2% indicated they would start an agriculturally related business including for example marketing or food processing, which was in line with the 16.3% of recent entrepreneurs that started new business. The majority of farmers, 57%, indicated they might leave the agricultural sector entirely as a first choice. Of those that would not consider starting a new business among the list of reasons provided, 51.1% ranked access to funds as

mortgages should include risk, and second order dominance rules as conventional risk theory has it. One avenue that needs to be investigated with greater thoroughness is that the structure of the LUR rental agreements offer essentially a risk-free alternative with higher returns than the risky (farming) activity. So far as we understand this to be the case it is unlikely that a deeper assessment of risk in this paper would take us much further than what we suggest. Schumpeter introduces various concepts of instability but does not use the terms risk or uncertainty. For a perspective on differing views about the role of uncertainty in entrepreneurship see Kanbur(1982). Kanbur also argues that Schumpeter asks too much of the entrepreneur in setting risk aside by selling risk to a third party or perfectly picking future outcomes. Schumpeter's use of the term 'instability' rather than risk and uncertainty as posited by Knight(1921) suggests that instability is of a slower moving form which can be adapted to in time. This is a different idea than managing and/or exploiting risks. Knight (1921) suggest that the entrepreneur responds to risk and uncertainties, whereas Schumpeter views this as white noise, favoring instead larger wavelets with more pronounced excursions that can shift trajectories and trend.

[22] In our field survey we use the Chinese characters for 'start a new business' (做生意: *Zuo Sheng Yi*) to capture active entrepreneurship in the sense that the respondent had actually started in a new business in recent years. For entrepreneurship we used the term 创业: *Chuang Ye* which might also refer to starting a new business but in Chinese lexicon is more closely linked to the adjective of being entrepreneurial. In the first context the interpretation clearly establishes investment at the extensive margin, but in the second, which can also include improvements in practices and internal innovations the term can refer to activities at the intensive and/or extensive margins.

one of the top three reasons not to do so, with 21.3% indicating funding as the top reason. Of

farmers who had not started a business but would consider doing so, 16.2% indicated that the

loans available were insufficient while 21.8% indicated an inability to obtain a mortgage if

needed. In comparison of those entrepreneurs that had started a business 16.4% claimed that

they still could not obtain adequate funding, with 11.7% indicating lack of mortgage credit.

7. Regression Analyses of Land Use Rights and Entrepreneurship

Although we have used specific responses from our field survey elsewhere in this paper, here

we want to examine more deeply the relationship between the mortgaging of LUR and

entrepreneurship. Specifically what we are interested in is the relationship between the

mortgaging of LUR and entrepreneurial activity. In a typically Schumpeterian framework we

treat this relationship as an endogenous one in the sense that expanding credit through the LUR

mortgaging facility will encourage entrepreneurial activity, while those who are entrepreneurial

will have a higher willingness to mortgage LUR. Consequently we instrument mortgaging LUR

and entrepreneurial ability in a Two-Stage Least Squares (2SLS) regression. A Hausman Test

confirms that the two dependent variables are endogenous, and therefore our 2SLS IV approach

is justified. This instrumental variables approach also resolves the errors in variables problem,

ensures that the problem is identified, and satisfies the exclusion restriction (Wooldridge, 2003;

Greene, 2003)

Our identification strategy, therefore, centers on two key variables, one of which is factual, and

the other conditional supposition. The 1st equation dependent variable is a yes/no binary

response to the question "*Have you ever started a new business?*" The 2nd equation dependent

variable is a binary question closely translated as "*If LUR can be used as collateral, does it affect your entrepreneurial activity?*" (Yes=1) (See also footnote 22), but with some wording change of the modifier 'entrepreneurial activity' depending upon whether the respondent a) has already demonstrated entrepreneurship by starting a new business (43.6%), b) had previously owned a business, had to stop for some reason, but may return to business with a LUR mortgage (2.3%) and c) had not, but indicated a willingness to, start a business (22.9%)[23]. Combined in the 2SLS model, the 1st equation allows a preliminary answer to the question as to whether individuals more responsive to using LUR mortgages are more likely to be entrepreneurial (a response to supply at the extensive margin); while the 2nd allows a preliminary answer to the question as to whether entrepreneurs operating at the extensive margin are more likely to demand mortgage credit than non-entrepreneurs (most likely) operating at the intensive margin. Our findings – to be presented in more detail later–indicate that 1) access to LUR mortgages is correlated with entrepreneurship and may, therefore, encourage investment at the extensive margin, and 2) the demand for LUR mortgages will come from entrepreneurs and non-entrepreneurs alike, suggesting that demand for LUR mortgages is driven by investment opportunities at both the intensive and extensive margins.

There are 19 additional control variables with additional instruments to capture regional effects that might account for province or county-specific credit policies. The control variables are defined in Table 1, with anticipated coefficient sign (+/-), and references to papers that have previously used equivalent variables. The entrepreneurship equation, includes computer use,

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[23] Note: except for these three types of farmer, responders also include some farmers who never have a willingness to do business and other famers who had previously owned a business but stopped for some reason, and now never to return business again. Hence, the total percent of these three types of farmer are less than 100%.

happiness, household specific shocks, PFI (percentage of farming income), years farming, savings, and income. Additional control variables in the LUR mortgage equation, include profit from farming, financial risk, formal credit, and loan demand. Because many of these variables are common variables, and largely self-evident, we describe them in Table 1 along with relevant references.

7.1 Method and Data

As discussed above, there is a high interdependency between LUR mortgage and entrepreneurship. Taking the endogeneity between entrepreneurship and LUR mortgage into consideration, we define the entrepreneurship and LUR mortgage as a 2SLS system of simultaneous equation as follows:

$$
\begin{aligned}
Entre = {} & \alpha_0 + \beta_1 \cdot LUR + \beta_2 \cdot PFI + \beta_3 \cdot savings + \beta_4 \cdot happiness \\
& + \beta_5 \cdot shock + \beta_6 \cdot income + \beta_7 \cdot asset + \beta_8 \cdot education + \beta_9 \cdot labor \\
& + \beta_{10} \cdot computer + \beta_{11} \cdot farmyear + \beta_{12} \cdot farmsize + \beta_{13} \cdot sex \\
& + \beta_{14} \cdot age + \beta_{15} \cdot knowledge + \beta_{16} \cdot reg + u
\end{aligned}
\tag{12}[24]
$$

$$
\begin{aligned}
LUR = {} & \alpha_0 + \alpha_1 \cdot Entre + \alpha_2 \cdot profit + \alpha_3 \cdot risk + \alpha_4 \cdot knowledge \\
& + \alpha_5 \cdot formalcredit + \alpha_6 \cdot loandemand + \alpha_7 \cdot asset + \alpha_8 \cdot education \\
& + \alpha_9 \cdot labor + \alpha_{10} \cdot farmsize + \alpha_{11} \cdot sex + \alpha_{12} \cdot age + \alpha_{13} \cdot reg + \varepsilon
\end{aligned}
\tag{13}
$$

There are no panel data sets tracking entrepreneurial activities of rural farm households, nor are there any large scale studies which have tracked the number of farmers that have applied for and been awarded mortgages and what they have been used for. Yet if the policy objective is to relax liquidity constraints to promote innovation and entrepreneurship at the intensive and extensive margin, some baseline information is critical as a first step.

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[24] Entre is short of entrepreneurship.

Because the land-transfer institutions and LUR mortgaging are so recent the opportunities to investigate actual behavior is limited, we structured a field survey of Chinese farmers in villages with and without authority to accept LUR mortgages. However, since the financial infrastructure to mortgage LUR was not in place at the time of the survey, few mortgages had been issued. For example, Districts of Pingqiao and Shihe in Xinyang City mortgages were issued starting in 2009 but only in a few villages and was not widely available. Likewise in Gongchang Town locating in Longxi, mortgages were allowed starting only in 2012. In Cities of Xingping, Xianyang, and Weifang there were no allowance at the time of the survey for mortgaging LUR. Because of the underdevelopment we use a contingent question on whether respondents *would* mortgage their LUR if they had the opportunity as an instrumental variable to capture the true effect. As a frame of reference, a recent study by Niu and Luo (2015) in two counties in Ningxia and one county in Shaanxi found that permitted mortgages county-wide since 2006 and 2010 respectively, finds that about 31.8% of farmers applied for LUR mortgage. Our results indicate that about 28% of our respondents would mortgage LUR if they had the opportunity which is reasonably close to the Ningxia results. We could then match this question to respondents' actual self-declared responses to whether they *are* engaged in entrepreneurial activity. Thus, while true intentions to mortgage LUR are unobservable we are satisfied that our model captures the hypothesized endogenous relationship while addressing related biases.

Our data is based on a survey conducted from July to August in 2014 in rural Shaanxi, Gansu, Henan, and Shandong province. Prior to conducting the survey the investigators scouted various regions, meeting with farmers, entrepreneurs and village leaders. The intent was to ensure a good balance between natural farm households and villages or areas with more entrepreneurial

activity. Because of this intentional selection bias our approach cannot be deemed random, however at the time of survey the selection of respondents within each village was random. Investigators conducted one-on-one interviews and filled in the questionnaires for each farm household. We completed 1,465 surveys of which 1,396 were usable. Table 1 presents the definitions, measurements and statistics of variables used in the regression analysis.

56.27 percent of households in this field survey are male, the average age of respondents is about 43.7 and the average education is junior school. 42.73 percent of farmers are in possession of computer at home, which denotes nearly half of the respondents have the availability of internet access. On average there are about three working people in each household. The average number of years farming is 20.31 years, each household has 3.16 Mu arable land on average and an average approximately profit of CNY1573/per capita/per year with about 10.47 % of income from farming activities. The average asset of each farm household is 244,444.10 CNY. 47.83 percent feel happy due to the satisfaction of their income. 31.92 % of the respondents have little savings after the consumption, and another 49.79 % of the respondents have some savings after the expense. 65.69 % of the respondents never suffered from difficulties or disaster in recently three years while 23.77 % did. 62.98 % agreed that borrowing entailed some level of financial risk (e.g. unable to repay loan, lose collateral); among them 16.31 % indicated that it is too risky to apply for a credit loan and risk ration themselves out of the credit market[25]. 32.67 % of the farmers in our field survey have loan demand, but only12 % of the respondents reported that they got access to a full loan in the most recent three years and

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[25] For a broader discussion of risk-rationing amongst Chinese farmers see Verteramo et al. (2014). As a point of comparison they find that 6.5% of respondent Chinese farmers are actually risk rationed.

another 3.39 % of the respondents got only part of the credit loan demanded from a formal institution. Additionally, 28.72% of the respondents agreed that LUR mortgaging was conducive to their entrepreneurial choice or activity. Among them, 51.98% is the farmers who had started a business already (entrepreneurs), 31.13% is the farmers who have a willingness to start a new business, and 1.86% is the farmers who had previously owned a business, had to stopped for some reason, but may return to business.

Table 1 Definitions, Measurements and Statistics of 2sls Variables

Variable	Definition and Measurement	Mean	Std. Dev.	Effect (direction)	Relating literature[26]
entrepreneurship	Whether the responder started a business or not:0=no, 1=yes	0.51	0.50	+LUR[27]	Carter & Olinto, 2003; Domeher and Abdulai, 2012;
age	Responders' age	43.70	10.11	+Entre[28] -LUR	Kaufman & Horn, 1996; Bönte et al., 2009; Feng et al., 2010;Brush, 2012
gender	Sex of responders: 0=male, 1=female	0.47	0.50	-Entre[29] -LUR	Birley et al., 1987; Buttner and Rosen, 1989; Kalleberg & Leicht, 1991; Thébaud, 2010;Brush, 2012
education	Responder's highest education level: 1=Illiterate, 2=primary, 3=junior, 4=senior, 5=vocational, 6=college or university	3.02	1.13	- Entre +LUR	Nafziger, 1970; Katz, 2007; Van Der Sluis et al., 2008; Folmer et al., 2010; Oosterbeek et al., 2010;
farming size	Total arable land (Mu)	3.16	4.23	+Entre +LUR	Fan et al., 2003; Helfand and Levine, 2004;Chen et al., 2009; Mullan et al.,2011
labor	Numbers of labor	2.60	1.02	+Entre -LUR	Sassen, 1990; Seeborg, Jin, & Zhu, 2000; Neumayer and de Soysa, 2005
asset	Total asset (Unit: Ten Thousand CNY)	24.4441	19.7576	+Entre - LUR	Holtz-Eakin et al,1994; Janvry & Sadoulet, 2001 Hurst, 2003; Buera,2009; Weber and Key, 2015
knowledge	LUR mortgage policy perception: Incorrect=0, correct=1	0.77	0.41	+Entre - LUR	Cohen and Levinthal, 1990;Popkin, 1979; Heckerman, 1975; Hilgert et al., 2003; William Harvey, 2012
reg1	Dummy variable: 1=Qianyang, 0=otherwise	0.25	0.43	+/-	-
reg2	Dummy variable: 1=Longxi, 0=otherwise	0.29	0.45	+/-	-
reg3	Dummy variable: 1=Weifang, 0=otherwise	0.20	0.40	+/-	-
reg4	Dummy variable: 1=Xingping, 0=otherwise	0.12	0.33	+/-	-
reg5	Dummy variable: 1=Xinyang, 0=otherwise	0.15	0.35	+/-	-

[26] Empirical research result can see in the relating literatures.

[27] "+"represents the positive effect, "+LUR" denotes that entrepreneurship has a positive impact on LUR. Likewise, the following listed variables have the similar and representing expressions.

[28] Entre is short of entrepreneurship.

[29] For the gender variable, we employ male as the compared group to analyze the impact of gender on the entrepreneurship and LUR.

LUR	If LUR can be used as collateral, does it affect your entrepreneurial activity?: 0=no, 1=yes	0.28	0.45	+Entre	Schumpeter, 1911; Goldsmith, 1969; McKinnon, 1973; Wang,2008; Chankrajang, 2015
computer	Whether farmer has computer or not: 0=no,1=yes	0.45	0.50	+Entre	Fairlie, 2006; Batjargal, 2006; Shirin Madon, 2000
happiness	Satisfaction with income: 1=extremely unhappy, 2=unhappy, 3=neutral, 4=happy, 5=extremely happy	3.46	0.74	+Entre	Richard,1995; Blanchflower et al., 2001b; Jensen and Luthans, 2006; Foo, 2011
shock	Whether shock happened in recent three years: 1=never, 2=slight shock, 3=serious shock	1.42	0.66	+Entre	Yang, 2005; Han,2008; Koellinger and Thurik, 2011
PFI	Percentage of farming income (%)	10.47	18.62	+Entre	Rao.1971;Zyl et al., 1993; Richard & Donald,1998; Sitko et al.,2014
farm year	Years of famers do farming work	20.31	14.04	+/- Entre[30]	Ambali, 2013; Kosgey, 2013
savings	Farmers' financial situation of income and expenditure	3.33	0.83	+Entre	Danes and Rettig, 1993; Hira and Mugenda, 2000; Chevalier & Lanot, 2002
income	Farmers' income level	9.06	3.31	+Entre	Rosenzweig and Binswanger, 1992
profit	Farming profit(Unit: CNY/mu)	1573.04	4964.05	+LUR	Reardon et al., 1994; Yesuf and Bluffstone, 2007
financial risk	Farmers' financial risk perception: 1=no; 2=yes, there is some risk but I can afford; 3=yes, too much risk for me to get access loan from formal institution and I cannot afford it;4=unclear	1.96	0.82	-LUR	Hazell et al., 1986; Meuwissen et al., 2001
formal credit	Application of formal credit in recently three years: 1=no, I haven't; 2=yes, I tried to apply for a loan but I gave up later; 3=yes, I tried to apply for a loan but I was rejected; 4=yes, I tried to apply for a loan and I got part of the loan; 5=yes, I tried to apply for a loan and I got all of the loan.	1.63	1.39	+LUR	Adams and Nehman, 1979; Feder, 1988; Reddy, 2013; Dower and Potamites, 2014; Nikaido et al., 2015
loan demand	The loan demand of farmers: 0=no, 1=yes.	0.35	0.48	+LUR	Kochar, 1997; Wahid, 2013; Garcia et al., 2015

[30] It is an indicator for having skills and interest in the adoption of new production techniques, new capital, and new occupation. The impact of farm year depends on the business industry. Specifically, a farmers start a new business relative to agriculture, long farm year is a determinate to become a professional technician or expert in agriculture production, which is beneficial to start an agricultural business. However, a shorter farm year will be more conducive to create a business in non-agricultural industries. In this paper, we focus on whether a farmer has been in a business or not, so the business industry is not taken into account. Therefore, the expectation influence of farm year on entrepreneurship is not confirmed.

7.2 Empirical Results

We use Stata 14.0 on the tests of endogeneity and robustness, and to estimate the relationship

between LUR mortgage and entrepreneurship. Our test result indicate that LUR mortgage and

entrepreneurship are endogenous. Also, when we test the robustness by including and excluding

the regional dummy variable, results also reveal that there is consistence and stability in the

coefficients of the simultaneous equations[31]. We present the 2SLS regression results in Table 2.

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[31] The results are also robust when we include the 9.1% samples of knowledge into the 2SLS regression analysis.
Take the heterogeneity of farmers into consideration, we use the results of exclusion of 9.1% samples in this paper.

Table 2 Results of 2sls Regression Analysis

Variables	Entrepreneurship equation			LUR equation		
	Coefficient	Std. Err.	t-value	Coefficient	Std. Err.	t-value
age	0.0024	0.0025	0.98	-0.0005	0.0016	-0.28
gender	0.03270	0.0489	0.67	-0.0881**	0.0321	-2.75
education	-0.0094	0.0200	-0.47	0.0127	0.0161	0.79
farm size	-0.0003	0.0003	-0.99	0.0001	0.0004	0.32
labor	-0.0287	0.0182	-1.57	-0.0130	0.0141	-0.92
asset	0.0009	0.0007	1.29	0.0004	0.0006	0.67
knowledge	0.0520	0.0588	0.88	-0.1089**	0.0412	-2.64
reg1(Qianyang)	-0.2008**	0.0791	-2.54	0.1317**	0.0612	2.15
reg2(Longxi)	-0.2082**	0.0826	-2.52	0.1677***	0.0549	3.05
reg3(Weifang)	-0.3093***	0.0772	-4.01	0.0920	0.0634	1.45
reg4(Xingping)	-0.1620*	0.0926	-1.75	0.1932***	0.0651	2.97
LUR	0.6669**	0.2935	2.27	-	-	-
computer	0.0933**	0.0414	2.25	-	-	-
happiness	0.0844**	0.0298	2.83	-	-	-
shock	0.0254	0.0295	0.86	-	-	-
PFI	0.0008	0.0010	0.76	-	-	-
farm year	-0.0024	0.0020	-1.21	-	-	-
savings	0.0259	0.0262	0.99	-	-	-
income	0.0286***	0.0066	4.36	-	-	-
entrepreneurship	-	-	-	0.0879	0.1127	0.78
profit	-	-	-	0.00678	0.0074	0.92
financial risk	-	-	-	-0.0158	0.0195	-0.81
formal credit	-	-	-	0.0232*	0.0127	1.83
loan demand	-	-	-	0.0716***	0.0240	2.99
constant	-0.2499	0.2377	-1.05	0.2207	0.1497	1.47
RMSE		0.5449			0.4479	
F-Stat		6.30			3.34	
P-value		0.0000			0.0000	

Note: *: $p<0.1$, **: $p<0.05$, ***: $p<0.001$

Table 2 provides the 2nd stage 2SLS results. The first set of results has entrepreneurship as the dependent variable while the second has (willingness to mortgage) LUR as the dependent variable. From the first equation we find the coefficient on LUR is 0.6669 (t=2.27) which is positive and significant. This provides strong evidence that respondents who indicated that they would mortgage LUR are more likely to be entrepreneurial. This could be to start new business or to grow the existing land base, but it provides a fairly strong signal that the new mortgage laws might well lead to follow-on investments at the extensive margin as the government intended. This finding is in line with the research of Jin and Deininger (2009) indicating that land transacting can contribute to significant productivity gains. However, when we examine the entrepreneurship variable in the 2nd regression (B=0.0879, t=0.78) it is not significant. This suggests that whether a respondent is entrepreneurial or not, is not an indicator of whether farmers would be willing to mortgage their LUR. So while it is true that farmers willing to mortgage LUR are more likely to be entrepreneurial this is not symmetrically so, since it cannot be said that entrepreneurial respondents are more likely to willingly mortgage LUR. This suggests to us that a sufficient number of farmers who have not self-declared as being entrepreneurial also have a strong interest in LUR mortgages. In other words, it cannot be said that only entrepreneurial types will self-select into the mortgage program, indicating that the policy has broad, and financially inclusive, and appeal. Of course farmers might mortgage for non-farm purposes (and might not even receive a loan at all), but it may also signify that farmers are willing to borrow against the LUR to cultivate their land at the intensive and/or extensive margin, again consistent with new land use policies.

The knowledge (of whether mortgaging is available) variable is not significant in the

entrepreneurship equation (B=0.052, t=0.88) but is negative and significant in the LUR equation (B= -0.1089, t= -2.64). In the first case we had thought that having knowledge of land use policy would positively relate to entrepreneurship but this does not seem to be the case, perhaps because the entrepreneurs were so far removed from farming and LUR on a day to day basis. As for the second result it suggest that those knowledgeable about local mortgage policies are less likely to be willing to mortgage them. But we also note that knowledge may not drive demand. In this same regression the coefficients for the formal credit (have borrowed from a formal lender; B=0.0232, t= 1.83) and Loan Demand (have a self-declared demand for credit; B=0.0716, t=2.99) are both positive. What this means is that respondents who have an actual demand for credit and/or a previous formal loan are more likely to be willing to mortgage LUR. This is rather obvious, but it also is in line with the notion that the assignment of even imperfect property rights frees up liquidity constraints and deepens rural financial markets; respondents with a demand for credit could either substitute traditional financial micro-credit for longer-term mortgage loans, complement existing credit relationships, and/or with a new right of collateral obtain access to credit that was previously unobtainable.

As for the control variables we find in the entrepreneurship equation no significance of age, gender, education, farm size, labor, assets, shock, percent of income from farming (PFI), years in farming or savings. We do find significance in the computer use variable (B=0.0933, t=2.25) variable and happiness variable (0.0844, t=2.83). In the LUR equation we find no significance in the age, education, farm size, labor, asset, profit or financial risk variables. But we do find significance in the gender variable (B=-0.0881, t=-2.75) which curiously suggests that males are less likely to want to mortgage LUR. We also find significance in the regional dummy

variables which indicates that regional policy, and regional heterogeneity, matters and that it cannot be assumed that all farmers in all regions are going to behave equally.

8. Discussion and Conclusions

In the past few years since 2009 China has made significant strides in reforming its laws and rules on LUR. Most significant is the allowance by farmers to rent their LUR to other farmers or agriculturally related enterprises and in some regions the ability to collateralize and mortgage these LUR. We believe that these new rules will ultimately be transformative in rural economic development, hopefully for the better. But for this to work the relaxation of rules, and potentially large outmigration from agriculture must coincide with job-expanding and wealth-creating economic development through innovation and entrepreneurial activity. Thus, the objectives of this study are to show the development of land user rights mortgage project in China and to explore the relationship between LUR mortgage and farmers' entrepreneurship. We used 2SLS regressions to estimate the relationship between LUR mortgage and farmers' entrepreneurship based on a survey of 1,465 farm households in Gansu, Shaanxi, Henan and Shandong.

We also spent considerable space on the economics of valuing LUR. The valuation is based on Ricardian rents. Using our own survey data and meetings from land banks in Shaanxi and Henan we provide some indication of how rent values affect transactions. For example in both Shaanxi and Henan we find that cash crop farmers (predominantly wheat-corn double crop) is about 489 CNY/mu. In Shaanxi the land banks were paying farmers 770 CNY/mu and this was even higher at about 950 CNY/mu in Henan. As we developed in section 8, if the cash rental

rate exceeds the incremental difference in current production and its next best alternative (expansion at the intensive/extensive margin, starting a new business, or accepting wage labor) there would be sufficient economic incentive to rent land under the new laws. This appears to be the case. With cash rent values well in excess of farm profits recent transactions in Shaanxi are about 55,000 mu and in Henan about 180,000 mu. Assuming that the cash rent values capture the true economic rents in lands next best alternative, and discounting at 6.5% we use a simple perpetuity calculation (Eq 11; see also Wang (2008)) and estimate for Shaanxi a potential in new loans for a household to start a new business is about 56,743 CNY/HH (U.S. $9,007), a substantial sum in rural China.

But whether these sums will translate into economic growth is largely unknown. Our conceptual framework is based largely on Schumpeter's ideas on innovation and entrepreneurship. The Schumpeter (1911) view of innovation and entrepreneurship rests on a few principles that when put in place will lead to economic growth. These include the introduction of a new good previously unseen by consumers; or a new quality previously inexperienced by consumers; The introduction of a new method of production, not necessarily a new scientific invention, and one that extends from manufacture to the handling of commodities; The opening of a new market to trade that was once foreign to the producer even if trade in the commodity had previously existed. the conquest of a new source of supply of raw materials or half-marketed goods regardless of whether the source exists currently or has to be created; and the carrying out of the new organization of any industry like the creation of a monopoly or the breaking up of a monopoly position (Baumol, 1993). Whether or not the new policies on LUR will ultimately drive China's rural (and general) economy remains to be seen, but our investigation provides

cause for optimism that transacting (renting) or mortgaging LUR will encourage innovation and entrepreneurial activity at the intensive and extensive margin.

The key result is that LUR mortgage has a positive impact on entrepreneurship. That is to say, farmers with a high probability to mortgage their LUR are more likely to be entrepreneurial. This suggests that China's new land use policy might well succeed in unleashing economic activities if liquidity constraints which is consistent with some recent views on the role of collateral and land rights (Chankrajang, 2015). However we also find that being entrepreneurial relative to non-entrepreneurial has no significant impact on whether respondents would mortgage LUR. The results seem to suggest that ultimately only those respondents, farmers and entrepreneurs alike, with a previous credit relationship or a self-declared demand for credit will mortgage LUR. This suggests that – in a positive way – that the new policies are not going to encourage farmers with no demand for credit to suddenly take on debt. From this observation it is unlikely that moral hazard should be a problem.

From here, it is critically important that rural transformation linked to the new LUR laws be monitored. This includes tracking farmers who have given up their LUR to the land banks, to monitor their entrepreneurial or wage activities. Efforts are also needed to monitor rental rates, to ensure that they ultimately satisfy Ricardian principles. As Ricardo (1815) points out rental rates in excess of economic value lowers profits, while rents below land in its next best alternative will stymie the rental markets. Ultimately a balance is required. Finally, there is a need to monitor and document how formal lenders approach LUR mortgaging. Although we report that many financial institutions are developing approaches to meet the demand, the volumes of loans, who are borrowers, and what loans are used for needs to be understood.

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