Veblenian Consumption, Cultural Entropy and Innovation in China

Abstract

Local culture has long been discussed as a hindrance to innovation across Chinese regions. Our hypothesis is that the anthropocentric agency of conspicuous consumption (Veblen 1899) (consumption of luxury goods) might be a mechanism for achieving a positive cultural impact on innovation in China. Namely, it acts as a multiplier of the local social capital and thus promotes local innovation. To operationalize this hypothesis, we use the measure of Cultural Entropy, which quantifies the variability between locally closed cultural milieu and locally open cultural milieu. Places with lower Cultural Entropy, where one type of milieu prevails, are expected to be more clubistic in nature. Hence, we test whether places with lower entropy trigger more conspicuous consumption aimed at surmounting the clubistic parochialism that prevents local innovation. We use a panel dataset for 31 Chinese regions for the period 2013 – 2019. Our results confirm that conspicuous consumption is triggered by low Cultural Entropy and in the same time it is beneficial for local innovation.

Key words: cultural entropy; Veblen; conspicuous consumption; innovation; Chinese regions; social capital;

JEL codes: Z10, R11, O18

Introduction

Innovation relies on the entrepreneurial spirit of the innovator. Entrepreneurial activity is a way for profit-making and a way out of poverty (Bruton et al, 2013; Quadrini, 2000). Thus, it is possible that innovation happens in societies with high levels of segregation between rich and poor, where the poor can hope to use their innovative ideas as a tool for socio-economic mobility (Aghion et al. 2018). China is exactly such a case of high inequality between the rich and poor, which persists over time and in spite of policy (Deng and Treiman 1997, Xie and Zhou 2014; Alesina et al 2020).

In 2021, China announced officially that it has just succeeded in surmounting poverty (Xie et al 2021). However, the country is still a place of a big gap between the poor and wealthy, which is a source of feelings of relative deprivation between people and between places (Rodríguez-Pose and Wilkie 2016; Wan and Su 2017). The presence of the group of the rich can be thought of as the club to which the poor aspire to belong.

Veblen (1899) has offered us the concept of conspicuous consumption as a cultural mechanism for people to break the social barriers and fit into their aspired clubs. This mobility is achieved by the poor through the consumption of luxury goods, which are in fashion and are consumed by the higher economic class in which membership is aspired. This type of consumptions is termed conspicuous consumption. It has been documented that more deprived individuals are more strongly prone to this type of consumption (Tubadji, Wee and Weber 2022).

Indeed, it has been empirically documented that there is high consumption of luxury goods in China, motivated with the consumer's desire to "keep up" with the higher economic classes, and this is found to be especially prominent among these who feel relatively deprived

(Ling, 2009; Zhang, 2022). One additional reason why we observe high conspicuous consumption in China is also place specific for the country. Namely, it relates to the fact that there is an old cultural practice in China of "keeping face". "Keeping face", as a social law, originating from the Confucians teaching, which stresses social conformity and the maintaining of social hierarchy (Ho 1976). It remains as one pivotal social code for Chinese society (Ambrose Yeo-chi and Myers, 1977). However, we argue here that wishing to consume conspicuously is not only a matter of individual preference, but it is also a behaviour triggered by the characteristics of the place where the consumers are situated.

Our take is that people get more prone to consume conspicuously in cultural contexts and localities which are not favourable for their socio-economic mobility through the use of their innovative ideas. Displaying conspicuous consumption is a way to signal your social capital, or even booster your social capital (Lin et, 2015). Therefore, in unfavourable for social mobility local contexts, people are likely to tap more often on Veblenian consumption in order to gain the social capital that can propel their innovation and consequently lead to their social mobility.

What is an unfavourable for social mobility local cultural context? From the work on cultural percolation of new ideas, we know that innovative ideas may or may not pass through the social network and become realized depending on whether six people in a row are likely to have sufficient cultural proximity to allow for the percolation to happen (Tubadji and Nijkamp, 2016). Put differently, cultural proximity builds social capital in the network that allows for new ideas to percolate. Similarly, Muringani, Fitjar and Rodríguez-Pose (2021) finds that social capital, mostly of binding (between groups) rather than bonding (within a group) type helps the innovation and growth of places. Tubadji et al. (2021) finds that local interaction between cultural capital and social capital determines the local inequality across Italian regions. (2022).

Finally, Tubadji (2022) has summarized the main take from the above relationship between culture, social capital and local inequality and innovation in what is termed cultural entropy. Tubadji (2022) defines cultural entropy as the measure of variety between the components in the local cultural milieu. The study finds that places with low cultural entropy have low social capital which does not allow for innovation and local flourishing. So, places which have low cultural entropy are unfavourable for innovation and socio-economic prosperity.

The current study aims to explore the interplay between the local cultural entropy and the mechanism of Veblenian consumption. We hypothesize that Veblenian consumption is used locally as a potential way to correct for local low cultural entropy, as an unfavourable condition for innovation (and by extension social mobility) in the locality.

The reminder of the paper is structured as follows. Section 2 offers a brief overview and systematization of the of the literature on innovation in China and its determinants, especially social capital. Section 3 outlines our Veblenian augmentation of the cultural entropy concept. Section 4 presents the database and elaborates the empirical strategy of the paper. Section 5 presents the results. Section 6 contains a discussion and some final conclusions about the role of conspicuous consumption in the context of cultural entropy to help fully understand the necessary modelling of the cultural impact on innovation.

Literature Review

Innovation in China

During the past two decades, China has been making efforts to transform itself into an innovation powerful (Popkin and Iyengar, 2007). However, despite the great achievement, studies have shown that some problems in Chinese innovation system still persist, particularly when it comes to the territorial challenges (Rodríguez-Pose and Wilkie, 2016; Magnus 2017). In recent years, R & D investment and foreign direct investments (FDI) are viewed as the vital forces to encourage innovation activities and technology upgrading for local firms and industries (Fu and Gong, 2011; Guo et, 2016).

Knowledge and capital are important backbones of innovation. However, regions have varied local features in terms of geographic location, openness, innovation conducive local infrastructure and agglomeration intensity. This factors determine the regional disparities in terms of: regional capability to utilize knowledge (Fu, 2008; Fu et, 2011; Li-Ying et, 2013), industry-academia partnership (Kafouros et, 2014; Hong and Su, 2012) , attraction of external finance (Yuan et, 2022). When using firms in Taiwan as a benchmark, Chinese firms generally face the problem of resource miss-allocation (König et, 2020). We label all these under the expression ‘productivity decline’ as we assume these developments indeed lead to lower research productivity as reported by Boeing (2020).

The literature has also tackled the innovation ability of China with cultural lenses and has tried to better understand the historical evolution of Chinese innovation capability.The famous work *Science and Civilization in China* by Joseph Needham (1956), documents Chinese invention from different Chinese historical dynasties and periods. This book ascertains China has

once been a very innovative country, and asks, how China lost its edge in innovating? The argument has usually closely been around Chinese culture. The adoption and centrality of Confucianism ideology used by the Chinese imperial period led to the creation of imperial rules to discipline people and suppress rebellion, which rules are thought to have hindered the innovative spirit of the Chinese (Wang, 2022). Likewise, as the imperial Chinese exams were considered a crucial way for people at the time to break social hierarchy barrier, it channelled the intellectual resources from scientific endeavours to the overemphasis on Confucianism learning, which was extremely exhausting and competitive (Lin, 1995). Yet, the latter implies high human capital was developed due to Confucians and high human capital means high potential to innovate. Thus, the cultural puzzle of Chinese innovation is highlighted by our study.

While the literature maintains that the rewards people received from innovating were much lower than spending time on Confucian learning during the late imperial period, for modern China, the focus has been less on culture and more on political regime and policy as factors for innovation. Scholars pointed out that the regional economic inequality between more developed and less developed regions is due to the inefficiency in resolving the conflicts between efficiency and equality (Fan, 1995; Kenderdine, 2017). Moreover, the Chinese historical cultural legacy might be detrimental for economic health. Yao(2022) noted that the same privileged group in Chinese society tend to be long standing and led to collusion and corruption. And eliminating corruption is identified as one of the major reason for the city level economic growth (Rodríguez-Pose and Zhang, 2019). This gives rise to one more aspect of the Chinese puzzle – how exactly do people handle the positive and negative cultural effects on their human development and innovation present for them by the local institutions as a context in which they are embedded?

Social Capital and Other Factors for Innovation

Regions are considered a suitable unit to study innovation, as a region has the autonomy of policy setting and differs in cultural base and institutional setting (Cooke et, 1997; Boschma, 2004). Generally regional studies on innovation centre on how to reduce the cost of knowledge sharing and diffusion. There are two competing theories for explaining innovation in regions: the specialization (agglomeration) literature and the Jacobean variety literature.

Following the agglomeration literature rationale, industries would benefit from industrial agglomeration (the industrial specialization), since agglomerating reduces transport costs, generates knowledge spill-overs and contributes to productivity (Ellison, 2010; Glaeser, 2010). Moreover, regional innovation ability tends to persist, as new innovation is built on the foundation of the previous ones. Past innovation also enhances the ability of receptivity and diffusion of innovation and the efficiency of transferring tacit knowledge, due to the presence of a common and well-built knowledge base (Uzzi, 1997; Armington and Acs, 2002; Huggins and Thompson, 2017).

The Jacobean literature, and in specific related and unrelated variety literature, has provided an explanation about innovation based on the notion of proximity (Boschma and Iammarino, 2009). Higher, more balanced variety between the sectors could create proximity. Several types of proximity could exist: organizational, institutional and cognitive proximity, which all can affect knowledge diffusion. There is also social and geographical proximity, and these last two types are supposed to assist the first three types of proximity (Boschma, 2010). And all these spatial and non-spatial proximity factors construct the complexity of the regional knowledge base (Mattes, 2011). However, regional proximity is not always equally supportive

for local innovation (Balland et, 2015; Gulati and Gargiulo, 1999). More frequent interaction could bring both positive and negative effects on innovation and proximity as it is itself in a constant dynamics and evolves with the already built knowledge network (Dasaratha, 2022).

In addition, social proximity is related to the notion of social capital (see Herrmann-Pillath, Feng and Guo (2019) and Root (2022) especially for the context of China). While there are many definitions for social capital, the definition from OECD (2007, p12) can be taken as a suitable operational definition in regional studies (Tubadji et al. 2021). It states that social capital is 'the links, shared values and understandings in society that enable individuals and groups to trust each other and so work together'. Social capital could be a facilitator of social proximity or it could be the hindrance force for innovation due to the vested interests. De Vaan et, (2019) found that social capital plays different roles during different stages of entrepreneurship. During the entrance stage, the entry of new firms in an industry could be hindered by social capital, while during the developing stage, social capital is playing a supportive role in facilitating firm entrance rate. Depending on its direction of impact, social capital could be divided into bonding social capital and bridging social capital. The former one is associated with enclosure and the latter one could be assisting connection between groups (Putnam 2001; Muringani et, 2022). This classification of social capital is in line with the classification of cultural capital according to CBD, where enclosure is brought by cultural heritage, while openness is brought by living culture. In the next section, we review the concept of CBD, its main definitions and its empirical studies on culture, social capital and innovation.

Veblenian Augmentation of the Cultural Entropy Mechanism

Cultural Entropy. Cultural Entropy is a notion that has been introduced in the field of Culture Based development (CBD). CBD is a research paradigm that engages with the quantification of the local cultural milieu (Tubadji 2012, 2013; Tubadji and Nijkamp 2015).

According to CBD culture is a complex entity and its complexity can be meaningfully reduced to two sub-entities: cultural heritage (inherited from past periods cultural attitudes) and living culture (currently experienced cultural attitudes). These are thought to be readily approximated with the stock of cultural assets that represent cultural heritage (CH) (cultural monuments, museums etc) and living culture (LC) (libraries, music halls, art performance centres etc.).

Tubadji (2022) defines cultural entropy as the balance between the share of local living culture and cultural heritage. The latter balance was theoretically explained as a determinant for local innovation. Empirical evidence for its impact was provided for the case of the EU NUTS2 regions over the period 2007 – 2017. The cultural entropy measure relies on the Shannon entropy and the Theil Index of Entropy – and it will be detailed statistically in our methodological section.

CBD finds in various empirical studies that CH is detrimental for innovation, LC is positive for innovation (Tubadji and Nijkamp 2016 (six degrees); Tubadji et al 2020 ERD – Milan). In this context, the places where the cultural entropy (i.e. the balance between CH and LC) is the highest, are the places where most innovation and socio-economic flourishing are achieved.

How Veblenian Consumption Augments CE – a Social Capital Multiplier Effect

Tubadji (2022) argues that when cultural entropy is higher this indicate that the places have more inclusive social capital (i.e. bridging type of social capital). Our contribution regards the case when the entropy is low and hence unfavourable (excluding) part of the local population in terms of the social capital. Inclusivity and opportunities ins uch context are only for those with higher social class.

In order to increase ones' opportunity for social mobility in such a context, we suggest that people tap on the Veblenian consumption mechanism. There is a solid base of micro-economic evidence for the presence of this mechanism linking Veblenian consumption and social distance and power relations especially in China (see for example Belk 1988; Gao et al. 2016). Here, Veblenian consumption acts as a multiplier effect for the available social capital in the following way.

The local milieu is favourable and has high social capital among the rich and is unfavourable and offers no access to opportunities of the poor. By consuming luxury goods, the higher orders of the relatively poor claim access in the club of the rich based on mimicking their luxury type of consumption. Acquiring cultural acceptance and recognition as part of the club of the rich based on their consumption behaviour, these poor individuals can now enjoy an extended social capital equivalent to the social capital for a member of the club of the rich.

Put differently, Cultural Entropy impacts the socioeconomic process by stimulating Veblenian Consumption when the entropy is low. In addition to that, as we know from Agent Based Models (ABMs) (Schelling 1971), individual preferences easily translate into magnified enactment of the preference in the entire system. While ABMs have shown this for segregation

preferences, this can easily be analogically true for cooperation preferences. When dealing with unfamiliar actors in a business environment, people usually would prefer to form the relationship of contract with familiar people as they would tend to form higher trust level and consensus between them. A region could achieve higher development when these two types of people are equally distributed, as the risk-aversion would reduce people's intention to form business cooperation.

Furthermore, our claim is that this type of Veblenian multiplier for social capital will be more intensively tapped on in places with worse social capital conditions. As we know from Tubadji (2022), places with low social capital are the places with low cultural entropy. Hence, where're there is low cultural entropy, Veblenian consumption is likely to be more often observed as a mechanism used to serve as a multiplier for the social capital that is locally at stake.

How the Multiplier Effect of Veblenian Consumption Affects Innovation

According to Tubadji (2022) places with high entropy are also places with high innovation – both social and economic. Thus, by the chain rule, places that correct their low level of social entropy with the Veblenian multiplier for the available social capital are hypothesized here to achieve improvements in their innovation output.

Again in Tubadji (2022) we read that cultural entropy and its effect may vary depending on whether the CH or the LC component is prevailing in the local cultural milieu when entropy is not at its maximum. If it is the CH component that is dominant, the social capital is directly lower than the one at maximum entropy. If the LC is the locally dominant sub-entity, the social

capital is indirectly decreased by feelings of left behind and is still lower than the social capital at maximum entropy.

Thus, we expect that Veblenian consumption affects the social capital of a place when it is in below maximum entropy conditions in two alternative modes. If the CH is the more dominant type of local culture, then the Veblenian consumption is likely to have less corrective effect on the social capital. While when LC is the more dominant part in the local cultural milieu, the multiplier effect from the Veblenian consumption will be at its highest efficiency.

Based on the logic that Veblenian consumption affects how individuals are welcome in a society – and by extension – how their ideas are accepted in a society, we hypothesize that Veblenian consumption affects regional innovation. This relationship can be summed up in the following two hypothesis:

H01: An unfavourable Cultural entropy triggers Veblenian consumption.

H02: The Veblenian consumption counters the negative cultural entropy effects on innovation

Data

The panel dataset used in this paper crosses year 2013 to 2019, covering all 23 provinces, 5 autonomous regions, 4 municipalities, namely the total 31 provinces of mainland China. The economic variables are from National Bureau of Statistics of China, cultural indicators used are drawn from various sources, including National Cultural Heritage Administration, Chinese QuYi Compilation, China Civil Affairs Statistical Yearbook. All descriptive statistics are available in Appendix A.

The main independent variable is Culture Entropy, estimated following (Tubadji 2022), which offers an index which comprehensively and accurately reflects the influence of both living culture and cultural heritage in terms of how balanced they are in the locality. A strength of the current paper is that we use 63 cultural indicator to quantify the components of the cultural milieu estimated in our Cultural Entropy index. Following the CBD recommendations, we reduce the complexity of all these 63 indicators to the two components of the cultural milieu CH and LC (Tubadji 2012, 2013). Practically, applying principal component analysis, the 63 indicators actually grouped in four factors which we labelled as follows: (1) Cultural Heritage (CH), (ii) Living Culture (LC), (iii) Social Capital (SC) and (iv) altruism (see Appendix B). We use the Ch and LC components to estimate the Cultural Entropy index following Tubadji (2022) as described in Appendix C[1].

Our main dependant variable in this paper is the number of patents filed by firms. In this paper, we use granted patent number of firms and research institutions as our main dependent variable. Compared with the patent number filed in each year, granted patent would be of better quality and they better reflect the regional innovation ability.

To capture the regional industry structure. We respectively use two indexes. For regional industrial unrelated variety industry measurement, we use the measurement of unrelated variety (Boschma and Iammarino, 2009). For industrial specification rate, following Muringani et al(2021), we use Krugman specification index.

[1] We the remaining factor variables obtained in our factor analysis in the empirical strategy according to the theoretical considerations and recommendations of CBD from previous studies (see Tubadji et al. 2021).

Our explanatory variables are the following. We include direct R&D capital investment in innovation and the number of persons working in R&D activities. We also use the regional overall physical investment, regional labour stock, regional human capital.

We control also for the regional economic structure in two ways. For regional industrial unrelated variety industry measurement, we use the measurement of unrelated variety (Boschma and Iammarino, 2009). To calculate the industrial specialization, we follow for comparability Muringani et al. (2021), and we use the Krugman specialization index.

To quantify the regional propensity to consume conspicuous goods, we aggregated the daily Baidu search index (a search engine similar to Google), available for each province. We use this information to generate a yearly provincial interest search index on 30 major luxurious goods brands in China. The rational here is that luxurious brands are the typical form of conspicuous goods. The use of the Baidu search index has several advantages over the use of sales data of goods. Firstly, people are interested in conspicuous goods even when they cannot really afford such goods. Thus, some people may buy counterfeits or purchase through other illegal or unofficial sources, and they will behave conspicuously as their preference is although their official statistics consumption footprint may not reflect it correctly. Parts of consumption are left out if using the official sales data due to the presence of a big grey market especially for fake luxury goods. Secondly, in this study, we aim to address how much people in each region have developed the mindset and awareness of consuming and worshiping luxurious goods, and who treat people that consume these goods as “higher social class”. In another word, such the Baidu search index is an indicator that is able to capture the genuine interests of people instead of real consumption data that is also endogenous to income. People who are not consuming luxurious goods but who still have the tendency to value material wealth and evaluate others by

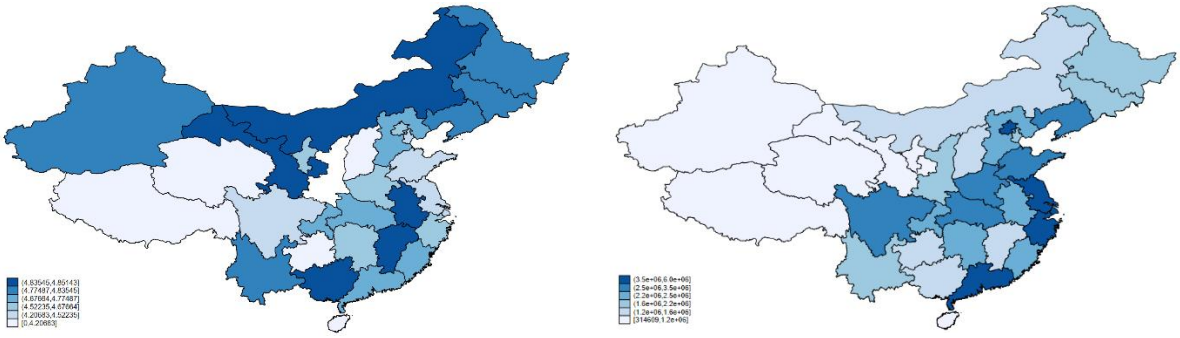
their lifestyle and material wealth are important for the development of the local economy and society through their behaviour and choices. See Appendix 8 for the detailed definition of all variables and their main descriptive statistics.

We add also controls for regional income, percentage of population aged between 15 to 64, urbanization rate and internet coverage. These controls relate to teasing out the Veblenian consumption heterogeneities.

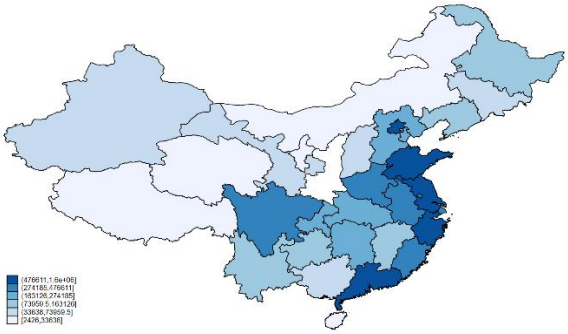
See below visualization of the geographical spread of the main variables of interest. The tables use the proxies which are most frequently used in the following analysis.

FIGURE 1

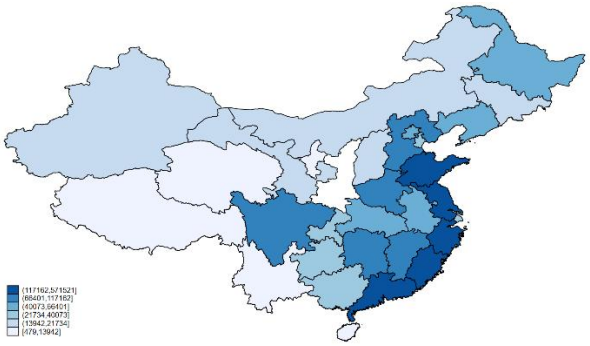
Geographic maps for the main variables of interest



Cultural entropy **Veblenian consumption**



Patents by firms



Patents by individuals

Note: Variables are presented in levels.

As seen from Figure 1, Veblenian consumption and cultural entropy clearly have opposite concentration across space. Also, it is visible that Veblenian consumption has a geography that coincides better with the innovation in Chinese regions.

Method

We suggest a hierarchical model where the cultural entropy affects the propensity to consume luxurious goods, and the latter affects innovation. This model can be expressed by the following system of two equation stating the interest in conspicuous goods as a function of culture entropy (and other controlling factors) then expressing the number of patents as a product of conspicuous consumption and other economic and industrial-structure-related controls.

$$Conspicuous\ consumption = f(CE, Z1) \qquad (1.1)$$

$$Patents = f(Conspicuous\ consumption; Z2) \qquad (1.2)$$

For simplicity, we use the standard assumption that the production function is of Cobb Douglas form and its linear transformation requires to take the logs of both sides of the equitation. Thus, we operationalize the above model as follows:

$$fashion = UV\_CULT\_ENTROPY + ln\_income + perc\_pop15to64 + perc\_urb + perc\_internet\_cov + e_1 \quad (2.1)$$

$$Patents\_firms = fashion + ln\_rnd\_expenditure + ln\_rnd\_pers + ln\_K + ln\_L + ln\_HC + UV\_sectors + e_2 \quad (2.2)$$

In the above models, the variables are defined as following:

- fashion – regional level of conspicuous consumption;

- Patents_firms – number of patents granted to firms or public entity;

- UV_CULT_ENTROPY – the cultural entropy in each region;

- perc_pop15to64 – percentage of population aged between 15 to 64 in a specific region;

- perc_urbanization – urbanization rate;

- perc_internet_cov – internet coverage;

- ln_rnd_expenditure – expenditure on R and D activities;

- ln_rnd_pers – the total number of personnel engaged in R and D activities;

- ln_K – fixed capital formation;

- ln_L – labour (i.e. total employment);

- ln_HC - human capital (percentage of workers with tertiary educational degree);

- UV_sectors – unrelated variety of the regional industries

As a robustness check, we first replace the dependent variable to the total patent number (including public and private investors). Then, we triangulate our results with alternative proxies of conspicuous consumption, namely regional level of interest in collectible urban vinyl toys (ShouBan (手办)) and in E-cigarette, denoted as toy and E_Cig respectively. Lastly, we delve into the mechanics of the impact of conspicuous consumption – testing the full causal chain how Veblenian consumption would affect social capital and thus impact regional innovation. The above three robustness checks give us advantage in both testing the reliability of our model as well as the validity of our use of indicators.

Results

Main Empirical Tests

TABLE 1

The Chinese Case Puzzle

VARIABLES	(1) ln_patents_firm	(2) ln_patents_firm	(3) ln_patents_firm	(4) ln_patents_firm	(5) ln_patents_firm	(6) ln_patents_firm	(7) ln_patents_firm
UV_CULT_ENTROPY	-6.689**	-8.014**	-8.014**	-23.576*	10.223	-7.152	3.775
perc_LC		2.148***		-19.773		-6.272	
perc_CH			-2.148***		19.773		6.272
inter_CE_LC				33.799		10.927	
inter_CE_CH					-33.799		-10.927
fashion						**4.47e-06*** **	**4.47e-06*** **
Constant	13.601***	13.364***	15.512***	23.392**	3.619	12.562*	6.290
FE Year	YES						
FE Region	YES						
Observations	195	195	195	195	195	195	195
R-squared	0.577	0.598	0.598	0.601	0.601	0.798	0.798

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Variables are presented in levels.

The results from Table 1 link the Cultural Entropy and Veblenian consumption concepts as follows. Surprisingly, for the case of China, we find that local Cultural Entropy has a negative association with local innovation. However, when we unpack the impact from the entropy and the CH and LC components, ultimately the Cultural Entropy effect seems to get faded away. Instead, when we use the Veblenian consumption proxy (fashion), it takes over in the horserace between the cultural variables and emerges as the most important factor that positively predicts innovation in the Chinese regions. We conclude that the anthropocentric agency is the one that overrides the cultural and institutional effects on innovation in Chinese regions. This is the first interesting result, which however merits further investigation, as we will clarify below. Indirectly, we find here that places with higher innovation have higher Veblenian consumption and lower Cultural Entropy –which is in line with our model (1) and its empirical operationalization as shown in model (2). This is the vantage point for our further explorations.

TABLE 2

Investment vs economies of scale as factors for innovation

spec.	(1)	(2)	(3)
dep.var.1		fashion	
UV_CULT_ENTROPY	**-1672155.004*** **	**-1632647.305*** **	**-1666882.979*** **
ln_income	519,701.069***	507,354.472***	518,900.277***
perc_pop15to64	-12,071.977	-46,363.718	-24,622.650
perc_urbanization	-8,151.005***	-7,172.157***	-8,130.176***
perc_internet_cov	4,662.486**	4,133.482**	4,666.690**
Constant1	-3485358.865***	-3392833.021***	-3473147.144***
Observations	192	192	192
R-squared	0.648	0.647	0.648
dep.var.2		ln_patents_firm	
fashion	**1.04e-06 ** **	**4.18e-06 *** **	**1.09e-06***
ln_rnd_expenditure	-0.164		-0.132
ln_rnd_pers	1.132***		1.176***
ln_K		0.460***	-0.136
ln_L		0.175	0.003
ln_HC		0.470	-0.618
Constant2	-1.269	2.662***	-0.905
FE Year	YES	YES	YES

FE Region	YES	YES	YES
Observations	192	192	192
R-squared	0.941	0.870	0.941

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We first conducted a three-stage-least regression to simultaneously test H01 and H02. The results are presented in Table 2. Across all three specifications, the results consistently show strong support for both of our hypothesis. We find that *fashion* is negatively associated with UV_CULT_ENTROPY, suggesting that the higher the cultural entropy is, the lower people would have the tendency to seek to impress by consuming luxurious goods, in line with our Veblenian consumption reasoning and previous findings (Tubadji, Wee and Webber 2022; Ling, 2009; Zhang, 2022). Furthermore, notably *fashion* is negatively related to *perc_urbanization*, implying that the interest in conspicuous consumption is more prevalent in regions with higher percentage of provincial population, rather than being only limited to more urbanized regions. This again confirms the Veblen effect – that it is the lower economic class that seeks to use Veblenian consumption as a vehicle to get acceptance among the wealthier circles.

Our three specifications horserace two main alternative theories for innovation: (i) investment; (ii) economies of scale and (iii) their empirical horse race. In the first specification, we find that especially the concentration of human capital engaged in R&D is most important for innovation, along with the Veblenian consumption. The second specification, where the factors of total capital and human input in the economy are used as proxies for regional economies of scale, finds that the total amount of innovations in a region depend on the outcome of the total labour force in the economy. Specification 3, and its horse race between the two theories, show that most important economic endowment for innovation is clearly the presence of personnel

invested in R&D activities. This is generally in line with endogenous growth theory. Moreover, the R&D_expenditure across all three specifications remains insignificant, potentially in line with the known declining productivity problem in the Chinese economy (Zhang et al. 2003; Brandt et al. 2020).

TABLE 3

Jacobean variety vs Marshall-Arrow-Romer specialization as factors for innovation

spec.	(1)	(2)	(3)	(4)
dep.var.1		fashion		
UV_CULT_ENTROPY	**-1685246.423*** **	**-1602586.431*** **	**-1684161.389*** **	**-1704879.060*** **
ln_income	543,398.739***	541,012.232***	524,574.849***	519,661.107***
perc_pop15to64	183,763.124	281,576.983	18,918.762	43,191.681
perc_urbanization	-9,268.242***	-9,370.304***	-8,429.785***	-7,882.927***
perc_internet_cov	4,726.633**	5,017.946***	4,694.904**	4,273.458**
Constant1	-3794901.391***	-3907046.408***	-3534108.616***	-3498691.362***
R-squared	0.648	0.647	0.648	0.648
Observations	192	192	192	192
dep.var.2		ln_patents_firm		
fashion	**4.39e-06*** **	**3.39e-06*** **	**1.01E-06**	**2.76e-06*** **
UV_sectors	1.646***		-0.058	-4.432***
Krugmans Specialization Index		-24,247.213**	-3,611.671	-8,109.273
ln_rnd_pers			0.956***	
ln_K				0.520***
ln_L				0.373**
ln_HC				-2.609**
Constant2	6.626***	8.527***	-1.618**	5.691***
FE Year	YES	YES	YES	YES
FE Region	YES	YES	YES	YES
Observations	192	192	192	192
R-squared	0.826	0.810	0.941	0.897

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 shows our explorations of innovation and our Veblenianly augmented cultural entropy mechanism in the context of the competing theories of (i) Jacobean variety and positive spill-overs from diversity versus (ii) the Marshall-Arrow-Romer (MAR) theory of specialization,

as the potential alternative drivers for regional innovation in China. Our first specification includes UV_sectors (an index of unrelated variety between the industries in each region) and our second specification uses the Krugman's Specialization Index (in line respectively with Boschma and Iammarino (2009) and Muringani et al. (2021)). Specifications 3 & 4 horserace these variables in the presence of controls, respectively for investment or economies of scale.

The effect of cultural entropy on Veblenian consumption, and the effect of Veblenian consumption on innovation is confirmed across all specifications again. Further to this, we find tha the Jacobean variety overruns the specialization MAR theories according to our data. And the unretaled sectoral variety has a bigger coefficient than the Veblenian consumption. However, the *UV_sectors* determinant changes its significant across specifications, while the Veblenian consumption behaves consistently across all specifications.

One explanation might have to do with the data we used to calculate this index. As we used the three sector industry data instead of the industry classification data. Thus, *UV_sectors* would be high when a region has both advanced and less advanced industry such as farming and mining While in farming and mining industries, innovations are relatively less likely to happen and high technology industries are less likely to transfer knowledge with them. Put differently, the *UV_sectors* it may contain hidden unwanted heterogeneity. Moreover, compared with specification 3 from Table 2, we could tell that when controlling for industry structure, ln_K, ln_L and ln_HC are all significant with human capital being negative. This result is in align with the potential waste of regional human capital problem (Gu et al. 2016).

Robustness Checks

TABLE 4

Robustness check 1 – outcome variable

spec.	(1)	(2)	(3)	(4)	(5)
dep.var.1			fashion		
UV_CULT_ENTROPY	**-1663163.815*** **	**-1568179.067*** **	**-1705002.638*** **	**-1609538.710*** **	**-1639427.756*** **
ln_income	533,988.009***	509,612.182***	542,090.682***	528,249.249***	527,302.671***
perc_pop15to64	81,114.554	-27,837.078	175,396.667	273,481.453	35,874.479
perc_rbanization	-8,748.084***	-7,291.706***	-9,205.386***	-8,721.848***	-8,493.223***
perc_internet_cov	4,652.687**	4,231.337**	4,695.894**	4,911.947***	4,725.151**
Constant1	-3667134.624***	-3470391.991***	-3764490.248***	-3800973.869***	-3601760.645***
Observations	192	192	192	192	192
R-squared	0.648	0.647	0.648	0.647	0.648
dep.var.2			ln_total_patent		
fashion	**5.59E-07**	**3.83e-06 *** **	**4.42e-06*** **	**2.94e-06*** **	**6.45E-07**
ln_rnd_expenditure	-0.273**				-0.149
ln_rnd_pers	1.286***				1.103***
ln_K		0.476***			-0.063
ln_L		0.234*			0.122
ln_HC		0.152			-1.040
UV_sectors			2.488***		-0.623
abs_KI				-25,238.677**	-4,199.499
Constant2	-3470391.991***	-3764490.248***	-3800973.869***	-3601760.645***	-0.260
FE Year	YES	YES	YES	YES	YES
FE Region	YES	YES	YES	YES	YES
Observations	192	192	192	192	192
R-squared	0.647	0.648	0.647	0.648	0.950

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As a robustness check, we use alternative proxies for innovation. We replaced the number of patents obtained by firms (which are public sector organizations) with the number of individuals who have patented or the total number of patents (including the firm patents as well as the individual investors who patented). Table 4 shows the estimations using the total number of patents, however, all results are generally internally consistent across the different proxies for innovation used. The results are also consistent with the overall analysis presented above.

TABLE 5

Robustness check 2 – main determinant variable

spec.	(1)	(2)	(3)
dep.var.1	fashion	toy	E_Cig
UV_CULT_ENTROPY	**-1666882.979*** **	**-146,398.296*** **	**-40,363.472**
	(446,418.431)	(44,584.135)	(45,471.139)
ln_income	518,900.277***	52,536.867***	65,905.398***
perc_pop15to64	-24,622.650	-10,075.883	-115,698.747***
perc_urbanization	-8,130.176***	-511.215*	-1,333.756***
perc_internet_cov	4,666.690**	294.865	644.164***
Constant1	-3473147.144***	-374,551.550***	-475,982.669***
Observations	192	192	192
R-squared	0.648	0.676	0.615
dep.var.2		ln_patents_firm	
fashion	**1.09e-06***		
toy		**.000012***	
E_Cig			**3.72E-07**
ln_rnd_expenditure	-0.132	-0.143	-0.205
ln_rnd_pers	1.176***	1.195***	1.497***
ln_K	-0.136	-0.143	-0.257**
ln_L	0.003	0.022	0.090
ln_HC	-0.618	-0.849	-0.166
Constant2	-0.905	-1.037	-2.781*
FE Year	YES	YES	YES
FE Region	YES	YES	YES
Observations	192	192	192
R-squared	0.941	0.937	0.939

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Our second robustness check entails using alternative proxies for conspicuous consumption. Namely, we use collectible urban vinyl toys, denoted as *toy*, or the search for e-cigarettes, denoted as *E_cig*. as alternatives for *fashion*. Table 5 shows the results. For *toy*, it shows the same result as fashion, while *E_cig* has no effect on innovation. These results may be due to the fact that the indicator *toy*, stands for a pure case of Veblenian consumption, while e-cigarettes might as well be consumed as a normal good besides being perceived by some customers as a Veblenian good associated with the wealthy class.

TABLE 6

Robustness check 3 – effect of Veblenian consumption on social capital

spec.	(1)	(2)	(3)	(4)
dep.var.1			fashion	
UV_CULT_ENTROPY	**-1676927.289*** **	**-1628737.591*** **	**-1586264.122*** **	**-1655818.480*** **
ln_income	538,883.460***	532,246.937***	537,629.100***	536,068.874***
perc_pop15to64	120,345.763	94,224.936	165,761.704	295,026.850
perc_urbanization	-8,879.191***	-8,404.004***	-7,763.398***	-8,725.378***
perc_internet_cov	4,569.286**	4,306.872**	3,197.711*	4,087.519**
Constant1	-3723573.712***	-3684464.195***	-3798783.473***	-3820633.166***
Observations	192	192	192	192
R-squared	0.648	0.648	0.647	0.647
dep.var.2	SC_correction	ln_volunteer	ln_Social_org (bridge)	ln_Social_group (bond)
fashion	**3.31e-06*** **	**6.97e-06*** **	**4.45e-06*** **	**3.81e-06*** **
perc_urbanization	-0.010*	-0.008	-0.054***	-0.060***
perc_pop_density	0.000	-0.000***	-0.000	-0.000
Constant2	-0.604*	9.727***	11.471***	11.380***
Observations	192	192	192	192
R-squared	0.440	0.386	0.563	0.530
dep.var.3			ln_patents_firm	
SC_correction	0.060			
ln_volunteer		0.024		
ln_Social_org			-0.247	
ln_Social_group				-0.356***
ln_rnd_expenditure	-0.126	-0.169	-0.155	-0.293*
ln_rnd_pers	1.304***	1.355***	1.471***	1.612***
ln_K	-0.210**	-0.269***	-0.277***	-0.293***
ln_L	0.031	0.047	0.186	0.260**
ln_HC	-0.123	-0.443	-0.603	-0.708
Constant3	-1.771***	-1.509**	-1.410**	-0.629
FE Year	YES	YES	YES	YES
FE Region	YES	YES	YES	YES
Observations	192	192	192	192
R-squared	0.942	0.947	0.943	0.939

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the robustness check 3, results presented in Table 6, we included an additional level in our hierarchical model to better express the mechanism of impact and moderation of cultural entropy and Veblenian consumption which we previously only assumed to be passing through the channel of social capital. The estimations in Table 6 include social capital explicitly in the estimation.

We are using four alternative measures of social capital – a factor variable, in line with CBD approach of measuring social capital (SC_correct), number of volunteers (as a general proxy of altruism), and two measures of bonding and bridging social capital in line with (Muringani et al, 2021; Putnam 2001). Across all our four specifications, we find that Veblenian consumption indeed affects positively social capital, indifferent of its type and its own effect on innovation. Moreover, we do not find a strong direct effect from social capital, presuming that Veblenian consumption is a more statistically clean indicator for the specific newly acquired through Veblenian behaviour social capital with impact on innovation. Put differently, social capital may mean many different things and what affects innovation seems to be the social capital gained in specific through Veblenian consumption.

Discussion

First, the Veblenian and cultural bias mechanisms discussed in CBD are confirmed about China. For these who live in a relatively more culturally rich region, such as Beijing, Shanghai (according to the factor analysis result, these two regions are denser in cultural heritage, despite the general belief that these are more living culture lively places), the barrier might come from the cultural esteem and arrogance, as historical culture is known for creating the sense of

privileged identity (Tubadji et al. 2021). Combined with the idea of "keeping face", it created incentives for people to try to impress and keep up with the pecuniary standard of living. For people who are living in relatively more living culture intense regions, the low stock of cultural heritage might not be enough for them to maintain their sense of their cultural identity, and thus feel relatively culturally inferior. Combined with the wide spread of internet use, they might be more biased towards consuming luxurious goods as they might be more susceptible to become the victim of the influence of materialism and consumerism. For these two types of regions with profound interests in conspicuous consumption triggered by cultural imbalance (low Cultural Entropy), people are more likely to evaluate each other based on their material possession and display.

Secondly, as a result of the above dependencies, in business, potentially people judge innovators based on how much social value they carry, to decide how much resource to invest in them. Considering innovation in Chinese firms, it seems that innovation strongly depends on social connections, relationships building, and perhaps less on creative thinking and innovation ability. Thus, Chinese firms in different regions might benefit from regional consumerism and "keeping face" culture and build strong business relationship using their social capital. It eases their way with business connections and building business circles. However, our result also hint that game for signalling and social capital networking seem to drive the recognition of innovation and patenting rather than quality of the innovation. This might be part of the puzzle of productivity decline in the country (Boeing 2020; Magnus 2018).

Conclusion

This paper explores the conspicuous consumption (Veblenian behaviour) as a vehicle for increasing the positive effects from local social capital, in places where the latter is scant. We showed that this Veblenian mechanism is conducive to higher local innovation.

Theoretically, we explain the above by relying on complexity theory for understanding the balance in the composition of regional culture, i.e. we use the notion of Cultural Entropy. Namely, we use Cultural Theory (Veblen & Bourdieu) and social mobility theories to form a testable hypothesis about the effect of Veblenian consumption on the construction and multiplication of social capital.

We have in fact two working hypotheses: (i) that Cultural Entropy affects Veblenian consumption and (ii) that Veblenian consumption boosts innovation. To test them empirically, we employ the following strategy. We measure the Cultural Entropy by calculating the Theil index for entropy, applied on the local cultural capital, defined as a complex entity with two main sub components: cultural heritage (CH) and living culture (LC). We test the impact of Cultural Entropy (the balance between CH and LC) on local Veblenian consumption. We expect that the lower Cultural Entropy triggers the use of this social capital creating mechanism. Next, we model the local innovation as a function of the Veblenian consumption and the new social capital that it has created.

We used provincial data of China, from the period of 2013 to 2019. Based on our empirical tests, our two hypotheses could not be rejected, suggesting that cultural entropy has influence on conspicuous consumption, which is then used to accrue more social capital and thus obtain higher regional innovation output.

These findings are both in line and very much value adding to the existing literature as follows. First, the CBD paradigm noted that regional socioeconomic development is strongly determined by cultural heritage and living culture, their interaction determines whether a region is attractive enough for human capital and whether it would be efficient in the utilization of other forms of capital employed in the production of innovation (Tubadji et al. 2020). We confirm that China also has strong historical cultural impact in its economy, which could be captured by using the CBD approach and LC also seems to exhibit positive effects on innovation in China.

Second, the findings of our paper extend the CBD literature as follows. Our results show that the innovation ability witnessed in China is the outcome of the interaction of Cultural Entropy with a type of anthropocentric agency, namely a behaviour termed Veblenian consumption, which is able to moderate the available stock of cultural capital in a locality. Put differently, our study suggests that Veblenian goods and conspicuous consumption serve as a multiplier for the social capital in Chinese society and its derived effects on innovation.

Future research should be necessary to deepen our understanding of the exact nonlinearities in the impact from Veblenian consumption on innovation. These are likely to vary when the local cultural entropy is away from its maximum level due to dominance of CH versus due to LC. Likewise, further research could be done using individual level data to confirm the identification of the here-assumed individual motivation behind the Veblenian consumption multiplier. The different modes of impact of the multiplier effect of Veblenian consumption on cultural entropy and ultimately on local innovation captures the stochastic nature of culture as a factor for local development, which clearly merits further investigation.

Our study is a first attempt to delve into the stochastic nature of culture as a determinant for local innovation. We have clearly documented that anthropocentric agency such as Veblenian

consumption (i.e., human behaviour) creates volatility in the effect from the local cultural capital on local innovation. Individual behaviour (such as consumption) can affect the informal local culture and networking that generate social capital, and this can help to overcome the effect of local cultural capital, its balance (Cultural Entropy), the rigidness of the local formal institutions and even the cultural persistence of places.

Appendix A

Descriptive Statistics

Theoretical motivation	Variable	Obs	Mean	Std. Dev.	Min	Max
Veblenian Consumption	fashion	217	342787.2	215635.3	17667	1000000
	toy	217	30381.7	22526.3	534	126511
	E_Cig	217	27795.2	22199.2	316	129263
Cultural Entropy	UV_CULT_ENTROPY	195	0.7	0.0	0.6	0.7
Social Capital	SC_correction	195	0	1	-0.8	6.7
	volunteer	217	299844.3	1204786	5	1.20E+07
	Social_Organization	217	22798.9	17784.4	536	97013
	Social_Group	217	10793.1	7638.9	478	38081
Innovation	ln_patents_firms	217	9.7	1.6	4.4	13.0
	ln_patents_indiv	217	8.5	1.5	3.0	11.5
	ln_total_patents	217	10.0	1.6	4.8	13.2
	ln_rnd_output	213	13.9	1.9	6.0	17.9
Controls (Z)	ln_rnd_expenditure	217	14.7	1.5	10.0	17.2
	ln_rnd_personel	217	11.1	1.4	7.0	13.6
	ln_K	217	9.6	0.9	6.9	11.0
	ln_L	217	7.6	0.9	5.3	8.9
	HC_real	217	0.1	0.1	0.0	0.5
	UV_sectors	217	0.9	0.1	0.5	1.1
	Krugman Specialization Index	217	0.0	0.0	0	6.54E-05
	ln_income	217	10.0	0.4	9.2	11.1
	per_pop15~64	217	0.7	0.0	0.66	0.81
	perc_urbanization	217	57.8	12.6	23.71	89.6
	perc_internet_coverage	210	52.4	10.7	32.46	78
	pop_density	217	2850.2	1120.7	1059	5541
	year	217	2016	2	2013	2019
	west	217	0.4	0.5	0	1
	east	217	0.3	0.5	0	1
	middle	217	0.2	0.4	0	1

Appendix B

Factor Analysis with 64 Indicators for Chinese Culture

Variable	Factor1	Factor2	Factor3	Variable	Factor1	Factor2	Factor3
Intangible cult. Heritage	0.5	0.43	0.36	*Book borrowing*	0.62	0.54	0.08
Historic site	0.3	-0.11	0.63	*Books & periodicals lent*	0.41	0.66	-0.19
Historic town	0.67	0.16	0.35	*Lecture at library*	0.05	0.89	0.25
Historic countryside	0.38	0.21	-0.01	*Lecture at library - audience*	-0.03	0.74	0.14
Opera	0.1	-0.14	0.52	*Training at library*	0.2	0.9	0.04
Opera celebrities	0.63	-0.05	-0.36	*Training at library - audience*	0.14	0.66	0.06
Quyi	0.68	0.08	-0.06	*Exhibitions at library*	0.24	0.83	0.17
Quyi celebrities	0.75	-0.15	0.07	*Exhibitions at library - audience*	0.07	0.94	0.06
Litterateur	0.96	0.15	-0.05	*Museum*	0.27	0.26	0.34
Litterateur- Qing period	0.94	0.19	-0.05	*Museum employees*	0.16	0.08	0.37
Litterateur - Ming period	0.96	0.1	-0.04	*Museum collections*	-0.07	0.07	0.21
Litterateur - Yuan period	0.81	0.14	-0.05	*Museum exhibitions*	0.32	0.56	0.13
Ancient academy	0.31	0.25	0.49	*Museum visitors*	0.42	0.44	0.49
Story	-0.25	0.27	0.35	*Jinshi exams*	0.8	0.12	0.16
Folktale	0.1	0.48	-0.13	*Karaoke*	0.56	0.34	0.4
Books	0.34	0.13	-0.16	*Internet cafes*	0.24	0.24	0.75
New books	0.34	0.05	-0.18	*Animation enterprises*	0.35	0.36	-0.25
Book printing	0.38	0.31	0.21	*Employees at animation enterprises*	-0.06	0.62	-0.09
Journals	0.03	0.17	-0.07	*Cultural community institutions*	-0.09	-0.04	0.94
Journal printing	-0.01	0.08	0.05	*Cultural community venues*	-0.09	0.03	0.9
Art groups	0.12	0.14	0.19	*Cultural community stations*	-0.08	-0.05	0.94
Performance of art groups	0.13	0.07	0.18	*Cultural community activities*	0.22	0.55	0.23
Audience of art performances	0.23	0.07	0.12	*Autonomy groups*	-0.08	0.05	0.76
Art Venues	0.64	0.33	0.18	*Divorce*	0.1	0.24	0.79
Non-art performances by art venues	0.75	0.05	-0.06	*Social organizations*	0.53	0.57	0.35
Art performance by art venues	0.61	0.3	-0.1	*Social groups*	0.54	0.5	0.34
Audience at non-art events at art venues	0.65	0.41	-0.11	*Volunteers*	-0.04	-0.02	-0.27
Audience of art events at art venues	0.36	0.55	-0.17	*Time voluneering*	-0.05	-0.02	-0.24
Library	-0.05	0.08	0.92	*Junior social workers*	0	0.82	0.01
Books in library	0.37	0.7	-0.11	*Social workers*	0.03	0.87	-0.06
Library cards	0.7	0.56	-0.01	*Marrow donation*	0.16	0.15	0.23

Book circulation	0.47	0.81	-0.02

Appendix C

Cultural Entropy Variables

The cultural entropy variable is generated following Tubadji (2022). I have adapted the approach of Tubadji (2022) according to the availability of proxies for CH and LC in my dataset, as shown below:

```
gen CC = (LC + CH)

gen perc_LC = LC/CC

gen perc_CH = CH/CC

gen ln_1_CH = ln(1/CH)
gen ln_1_LC = ln(1/LC)

gen S_LC  = ( perc_LC * ln_1_LC)
gen S_CH  = ( perc_CH * ln_1_CH)

gen UV_CULT = (S_LC + S_CH)
```

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