The Social Credit System (SCS) and its impact on the economic growth of clothing manufacturing companies in China

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I. Introduction & Motivation

In 2014, the Chinese government released a planning document titled "Planning Outline for the Construction of a Social Credit System 2014-2020". The Social Credit System (SCS) is another sweeping program to facilitate a transition from a centrally planned economy under Mao Zedong's rule into a modern market-based economy. Historically, this transition has been successful resulting in poverty reduction and massive economic growth. To illustrate, during 1978 and 1993, China grew its GDP by 9% on average per annum and was extremely effective at reducing poverty with the "...number of people living in absolute poverty…reduced from over 250 million to less than 100 million in this period" [1].

However, there are visible growing pains from this blistering market-based transformation since Mao's death in 1976 such as rampant intellectual property theft, corruption, and tax evasion. In order to have a working market-based economy: property rights, a formal legal system, and a structured fiscal system need to be adopted by its people and enforced by its government. According to Qian and Wu, China lacked many institutions to replace the old ones, "Fundamentally, there was no rule of law, and the State and the Party, not laws, were governing the economy" [1].

Thus, the SCS is a way to create trust in the marketplace and help the country adopt a formal legal system. This is accomplished by tracking and recording each companies' adherence to laws via large scale data aggregation of financial and social components. Some examples of negative behavior are instances of bribery, scams, or food safety violations. The SCS is incentivized by rewards (e.g. low-interest bank loans and subsidies) and punishments (e.g. ban on travel or business permits). Thus, this SCS program has significant implications on the growth of companies specifically in terms of changing in lending or investment behavior.

Existing research on the SCS is sparse, as the program outline is not yet finalized until the end of 2020. A paper by Roger Creemers titled "China's Social Credit System: An Evolving Practice of Control" is frequently referenced by other sources and is well-developed in explaining the history,

[1] Qian, Yingyi; Wu, Jinglian (August 2000). "China's Transition to a Market Economy: How Far across the River?". Stanford Center for International Development.

description, and possible implications of the SCS. [2] There were no RCT studies identified on this topic.

II. Background

Given that the rewards and punishments for rule adherence can have a significant financial impact on companies, the focus of the RCT study is on the lending and investment behavior of Chinese clothing manufacturing companies exposed to this SCS system. The theory of change is based on the belief that the benefits such as better access to low-interest loans or expedited government will influence companies to act lawfully.

As further detailed in Section III, the study will focus on a clustered random sample of 60 cities with outcomes at the company level. In the interest of similarity in baseline characteristics, the cities will be randomly selected within the category of "Tier III" cities. The Chinese city tier system is not officially recognized by the government, but defined by media and accepted by the general population. This RCT study uses the city tiers as defined by the South China Morning Post which categorizes 613 cities in 4 different tiers across GDP, population, and political governance strata. [3]

For example, a Tier I city such as Shanghai or Beijing would include cities with GDP over $300 billion, 15 million people, and run by the central government. In contrast, the RCT study will focus on Tier III cities that have a GDP between $18 billion and $67 billion, a population of 150,000 to 3 million people, and a government run by "prefecture capital cities".

As of April 2018, there have been 36 pilot systems rolled out, among them include cities such as Rongcheng, Chengdu, and Hangzhou.[4] Each pilot program is not identical, but all include similarities of buckets of good behavior ("red-list") and bad behavior ("black-list") with respective reward and penalties. After the planning period ends in 2020, the Chinese government plans a national roll-out.

According to Kostka, on an individual level, the consensus among the pilot cities have been highly positive, with "80% of respondents either somewhat approving or strongly approving SCSs". [5] The citizens view the program as a way to "improve quality of life and to close institutional and

[2] Creemers, Rogier (May 2018). "China's Social Credit System: An Evolving Practice of Control". SSRN.
[3] Hernández, Marco. "China city tiers". South China Morning Post. Retrieved 2018-04-01.
[4] Mistreanu, Simina (3 April 2018). "Life Inside China's Social Credit Laboratory: The party's massive experiment in ranking and monitoring Chinese citizens has already started". Foreign Policy. Retrieved 15 December 2018.
[5] Kostka, Genia (February 2019). "China's social credit systems and public opinion: Explaining high levels of approval". Sage Journals.

regulatory gaps leading to a more honest and law-abiding behavior…". Despite this, the perception of the program from a company level perspective may differ.

III. Research Design

The research question is to study the effects of how Social Credit System (SCS) impacts the credit and investment behavior of Chinese clothing manufacturing companies.

The purpose of focusing on a subset (clothing) of the manufacturing industry is to help maintain baseline characteristics in treatment and control cities. Examples such as cost structure, growth rate, or lending behavior may across industries. Additionally, the clothing manufacturing industry is stable and generic which makes it more predictable in a study.

As mentioned in Section II, there will be a "tiered" stratification of sample cities. The focus on Tier III cities is due to a larger amount of cities to randomly sample from amounting to roughly 70 cities. In contrast, Tier II cities are generally defined as 30 cities, which would be concerning for deriving the benefits of increased power.

After the 2020 planning period is over, a clustered random sample of 60 cities in the set of 70+ Tier III cities will be selected. The treatment and control will be balanced, with 30 cities being given the SCS and 30 acting as a control. Economic outcomes will be observed at the level of the company. The timeline of the study will be from January 2021 to January 2031.

Further, data on selected cities will be collected from government, company and other public resources. Pre-treatment baseline characteristics of treatment and control cities in aspects such as GDP, population, and growth rates will be recorded.

For additional validation, a T-test will be used to test for statistically significant differences and then sampling will be evaluated for balance. Lastly, the baseline data will be used in the calculation of a difference in difference (DID) in order to remove time-invariant differences between cities as shown below:

$$(E[Y_{1c} \mid t=1] - E[Y_{1c} \mid t=0]) - (E[Y_{0c} \mid t=1] - E[Y_{0C} \mid t=0]) \quad [1]$$

The OLS regression model to be used is:

$$Y_{ct} = B_0 + B_1 T_c + B_2 post_t + B_3 (T*post)_{ct} + E_{ct} \quad [2]$$

- Y_{ct} = The outcome variable that is an economic index of lending and investment for city "c" at time "t"
- T_c = dummy if the observation city "c" is in the SCS treatment group
- $Post_t$ = post-treatment dummy at time "t"

Additionally, a cluster MDE is performed, given the following specifications:

Constants	
t (α/2)	1.96
t (1-k)	0.84
P	0.5
σ^2	1
σ	1

Parameters #1:

Parameters		Note
ρ (ICC)	0.05	[6]
J (# of clusters)	60	# of Cities (T & C)
n (# in each cluster)	500	# of Businesses in Cities
Total Sample Size	30000	Total # of Businesses
Cluster MDE	0.165	

Parameters #2:

Parameters		Note
ρ (ICC)	0.04	[6]
J (# of clusters)	60	# of Cities (T & C)
n (# in each cluster)	1000	# of Businesses in Cities
Total Sample Size	60000	Total # of Businesses
Cluster MDE	0.146	

Parameters #3:

Parameters		Note
ρ (ICC)	0.06	[6]
J (# of clusters)	60	# of Cities (T & C)
n (# in each cluster)	300	# of Businesses in Cities
Total Sample Size	18000	Total # of Businesses
Cluster MDE	0.182	

First, it is assumed that $t_{\alpha/2} = 1.96$, given a 5% significance, $t_{1-k} = .84$, assuming 80% power, equal proportions(P), and $\sigma = 1$. Further, basing parameters off a comparable study on a large-scale cluster RCT in China to see the effect of sodium reduction on rural health, ρ (ICC) values vary from of .04-.06

while n (# of businesses in each city) ranges from 300-1000.[6] J (# of city clusters) remains at 60 due to the limitation of 70+ Tier III cities in China. The cluster MDE values vary from 0.146 to 0.182, which is reasonable in comparison to a general guideline of 0.2 or less.

Given the intended research design, we are assuming:

- Completion of the government planning period will end in 2020 without delay or revisions
- The SCS program for each city will be consistently defined and applied
- In 2021, at least 30 new Tier III cities will be on an SCS plan to act as a treatment
- The SCS program will stay consistent in its methodology in the 10-year study time frame
- The government, cities, and companies will allow access to data on financials, SCS metrics, and other information
- Tier III cities will have clothing manufacturing activity

IV. Threats to validity and conclusion

There is high uncertainty of how the government plans to define or implement the SCS nationwide at the end of 2020. Further, it is clear from the pilot program of several dozen cities, that the program does vary in its scope and criteria. For example, some cities had an additional point scoring system, whereas others did not. The unpredictability of the program, the roll-out, and access to government data will be the key concerns in the current research design.

To conclude, there are significant policy implications from understanding the effects of the SCS affecting the behavior of companies based on rewards and punishments. On an individual level, the SCS program in pilot cities has been overall positive and anecdotally has changed the behavior of its citizens to follow laws for fear of the repercussions. There is a reason to believe that companies will respond similarly to these incentives.

If the study shows these incentives affect the lending and investment behavior of clothing manufacturers, then there can be additional extrapolation into other industries as well in order to promote economic growth.

[6] Li, et al. (November 2013). "A LARGE-SCALE CLUSTER RANDOMIZED TRIAL TO DETERMINE THE EFFECTS OF COMMUNITY-BASED DIETARY SODIUM REDUCTION – THE CHINA RURAL HEALTH INITIATIVE SODIUM REDUCTION STUDY". U.S. National Library of Medicine.

V. Bibliography

1. Qian, Yingyi; Wu, Jinglian (August 2000). “China’s Transition to a Market Economy: How Far across the River?”. Stanford Center for International Development.
2. Creemers, Rogier (May 2018). “China's Social Credit System: An Evolving Practice of Control”. SSRN.
3. Hernández, Marco. "China city tiers". South China Morning Post. Retrieved 2018-04-01.
4. Mistreanu, Simina (3 April 2018). "Life Inside China's Social Credit Laboratory: The party's massive experiment in ranking and monitoring Chinese citizens has already started”. Foreign Policy. Retrieved 15 December 2018.
5. Kostka, Genia (February 2019). “China’s social credit systems and public opinion: Explaining high levels of approval”. Sage Journals.
6. Li, et al. (November 2013). “A LARGE-SCALE CLUSTER RANDOMIZED TRIAL TO DETERMINE THE EFFECTS OF COMMUNITY-BASED DIETARY SODIUM REDUCTION – THE CHINA RURAL HEALTH INITIATIVE SODIUM REDUCTION STUDY”. U.S. National Library of Medicine.