# The Long-Term Effects of China's One-Child Policy

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## Abstract

We analyze the Long-term effect of China's One-Child Policy (OCP) from the window from 2003 to 2020 when the first wave of only children has grown up and formed a family. With Regression Discontinuity Design to construct a counterfactual, we document that the stricter OCP will lead to a dramatic drop of divorce cases by almost 30 thousand and CPI in 2004 value by almost 5, along with a jump of the share of the secondary sector in GDP by 13% and house price growth rate by more than 100%. A placebo analysis of the Two-Child Policy verifies that the result is uniquely caused by the OCP.

**Introduction**

Starting in 1972, China started to restrict population through a family planning policy by providing pecuniary incentives for those who space the birth of their children 4 years apart. Following that, a stricter One Child Policy (OCP) was released in 1979, which only allowed each family to have one child, and violating the law would be subject to financial penalties proportional to household annual income (Ebenstein, 2010; Wei & Zhang, 2011).

**Figure 1**

*Map of Provincial OCP Policy Preference*
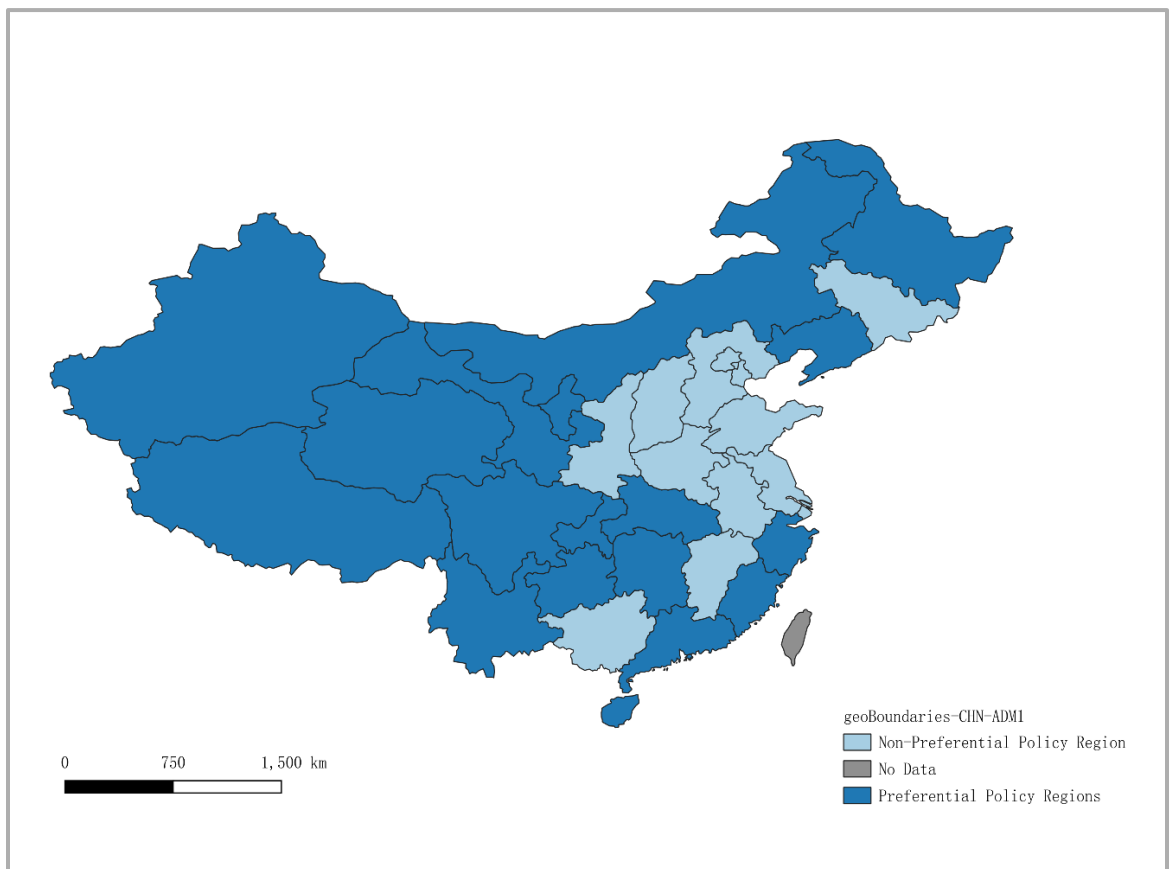


Nonetheless, the implementation of OCP is heterogenous, as some provinces received preferential treatment, in which the Han-Minority family are allowed to have more than one child.

We use non-preferential OCP and strict OCP interchangeably hereafter. In our study, we take the presence of preferential policy endogenous, and we exogenized it with a spatial Regression Discontinuity Design (RDD). The provinces with different OCP policies are shown in Figure 1.

We chose the border cities of the province, which are neighbouring those with different strictness of OCP. These observations are comparable, and the only difference comes from the strictness of OCP, enabling us to find the plausible causal relationship between the strictness of OCP and another outcome of interests in the long run, with unique, comprehensive city-level panel data from 2003 to 2020.

Additionally, we employ a placebo test by using the successor of OCP, the Two-Child Policy (TCP), that replaced OCP in 2018 due to the concern of population aging the authority. The TCP is again national, but the treatment is homogenous, meaning that there is no difference in Treatment strictness and preferential treatment. As the TCP started in 2018, we changed the window to the 2018-2020 period and used the same border cities to check whether the outcome of interests that were significant in OCP, and only the CPI in 2004 value remains significant. Our research could shed light on the government of the long-run effect of birth control policy (OCP), and the placebo test also works as a check of how the effectiveness of a successor policy (TCP) could be influenced by the strictness of its predecessor (OCP). Furthermore, the research would enlighten policymakers, not only in China, to re-consider the correct incentives and solutions for population aging, considering it becoming a prevalent issue around the world (China Development Research Foundation, 2024).

## Related Literature

The One-Child Policy (OCP), especially its negative spillovers, have been well-studied. From the missing girls (Sen, 1990; Ebenstein, 2010; Chen, Li and Meng, 2013; Jayachandran, 2017; Almond, Li and Zhang, 2019) to the abandoned children (O'Connell Davidson, 2011; The (State Council, 2011); From the schooling disadvantages to (Qian, 2009) to the distortive financial activities (Wei & Zhang, 2011; Bao et. al., 2019). However, to the best of our knowledge, we are the first to research the long-run effect of OCP with novel spatial RDD and link it with its successor, the Two-Child Policy (TCP). In this literature, we find out that the causal interpretation is not necessarily sound. For example, Bao et al. (2019) run a simple OLS to analyze the causality between OCP and child abandonment and abduction, homogenized by sex ratio at birth (SRB) and assuming unconfoundedness. But we find the linkage between gender preference with SRB across regions implausible, as the covariates like clan culture, lineage (kinship), suitability of rice, and other factors that have been proved to influence compliance to OCP, sexual preference, and the propensity of political control are not included (see, e.g., Talhelm et al., 2014; Tang & Zhao, 2023; Chen et al., 2024).

## Data Source

As we are interested in the Long-term effect, we merge a couple of datasets from the literature of Chen et. al. (2024), in which we obtain the prefecture-level panel data from 2003 to 2020. The OCP strictness data is manually scripted from National Health and Family Planning Commission of the people's Republic of China, which has been used widely (see Huang et. al., 2023 for example). Lastly, we manually obtain the distance between two cities with Google Map. As some

form of transit, e.g. highspeed train *(goatee), was not available back then, we only record the driving distance in kilometres* between two border cities. We took the shortest car driving distance for simplicity, as old cross-provincial roads are typically straight and mostly used. The longer roads, e.g., costly charged highways, are not considered. Moreover, we have identified bordered cities in administration level 3 (city-level), where if any sub-city level region within the city's administration has a connected comparing city defined above, the whole city will be defined as 'boarded.'

## Methodology and Statistical Result

### Statistical Approach

In our paper, we use the spatial regression discontinuity design (RDD), which exploits the one-child policy (OCP) strictness that is orthogonal to our outcome variable of interests. We choosed following variables: GDP by secondary industry (scnd_gdp); Disposable income per urban resident (incm_tnpc); Number of divorce cases(dvrcecs_stel_priv); Proportion of foreign capital received to GDP (open); log of average housing price (ln_avghsprice); period growth rate of housing price (hsprice_pegrth). To the best of our knowledge, the strictness of OCP, or whether a province receives preferential OCP that allows family to have more than one child, only correlates to the share of minority in the province. However, if we zoom in to the border city between two provinces with different OCP strictness, such difference become trivial, and the assumption of exogeneity of OCP strictness becomes innocuous. Hence, we specify our model to be the following:

$$Y_j = D_j * X_j + a_j + e_j$$

In the regression above, $Y_j$ is the outcome variable of interests for the border city $j$. $D_j$ is the dummy variable of whether the border city $j$ is in the OCP-preferential province. $X_j$ is the log-normalized geographic location of the border city $j$, specifically, it is the log of distance of $j$ in Preferential-OCP province to another border city in another province without Preferential-OCP. If $X_j$ is positive, then $j$ would be in the province with preferential-OCP and the distance to the closest neighbouring city without preferential-OCP and is the value of $exp\{X_j\}$, in unit of kilometers. If $X_j$ is negative, then we are travelling from the border city without a preferential-OCP to another one with a preferential-OCP, and the distance is $exp\{|X_j|\}$, the absolute value. $a_j$ is the vector of provincial and year fixed effect, and $e_j$ is the error term.

**Regression Results and Discussion**

**Table 1**

*One-Chile Policy RDD Results*

| Dependent Variables | St.Err. | t-value | p-value | [95% Conf interval] | |
|---|---|---|---|---|---|
| scnd_gdp | 9.4669 | 3.214 | 0.004 | 3.119 | 15.815 |
| incm_tnpc | 6816.2556 | 3268.940 | 0.039 | 360.726 | 1.33e+04 |
| cpi_04 | -4.3155 | 0.911 | 0.000 | -6.115 | -2.516 |
| dvrcecs_setl_prov | -2.29e+04 | 7977.045 | 0.005 | -3.87e+04 | -7144.511 |
| open | 0.0029 | 0.001 | 0.007 | 0.001 | 0.005 |
| ln_avghsprice | 0.3488 | 0.173 | 0.045 | 0.008 | 0.690 |
| hsprice_pegrth | 82.5367 | 24.023 | 0.001 | 35.096 | 129.977 |

*** p<.01, ** p<.05, * p<.1

*Geographical Effects on Marriage*

Not all the results are interpretable, for example, the openness attitude towards foreign direct investment. To make economic sense, we pay close attention to certain variable of interests. Interestingly, we find out multiple outcome variables of interest to be significant. First, in Figure 2 the number of divorce cases received by provincial courts significantly jump down by 30 thousand when we move from a non-preferential-OCP province to a preferential-OCP province. More importantly, as the non-preferential-OCP cities move closer to the preferential-OCP, the divorce cases increase. Recall that in our design, year and provincial fixed effects are included, and hence, the only way we can interpret the result is from the resentment and desperation of having more than one child.

**Figure 2**

*Regression Discontinuity between Distance to Border and Divorce Cases*
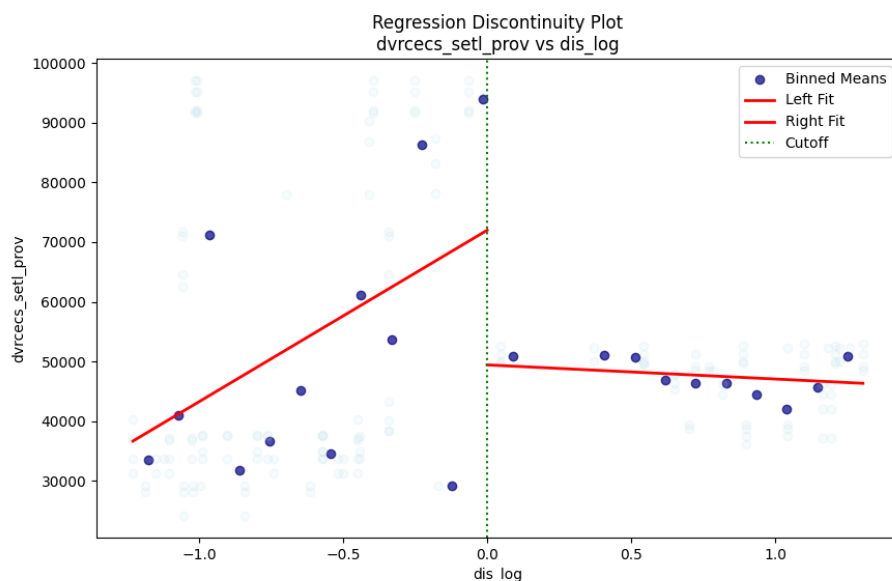
For the preferential-OCP border cities that are closer to the non-preferential-OCP border cities, the citizens are more likely to receive information about the family situations, i.e., the number of kids from another province. So, the families in the preferential-OCP cities may compare their potentially more demanding childcare and financial stress with their neighbours who are only allowed to have one. Hence, the number of divorces gradually increased, and once we changed to cities with strict OCPs, the number of divorce cases significantly dropped, leaving us a flat line after the cutoff.

*Effects on Economy Factors*

On the other hand, the regression result also indicates the influence of OCP on economic factors, mainly those heavily correlated to population supply. All the factors show a diminishing effect by the distance to the border.

**Figure 3**

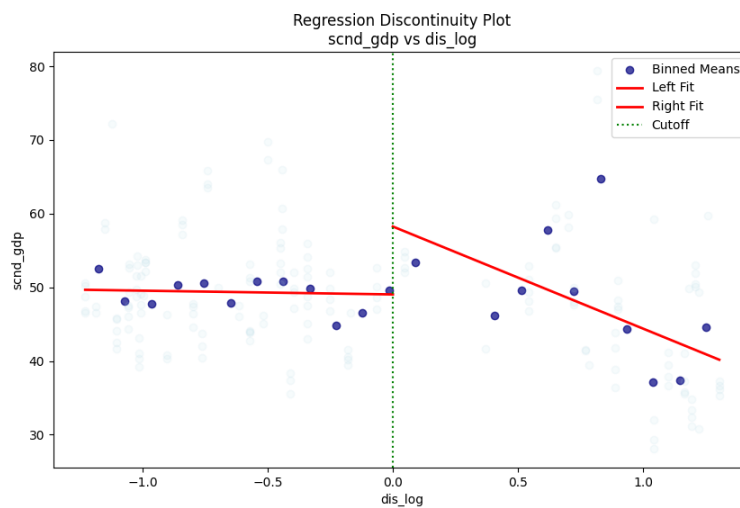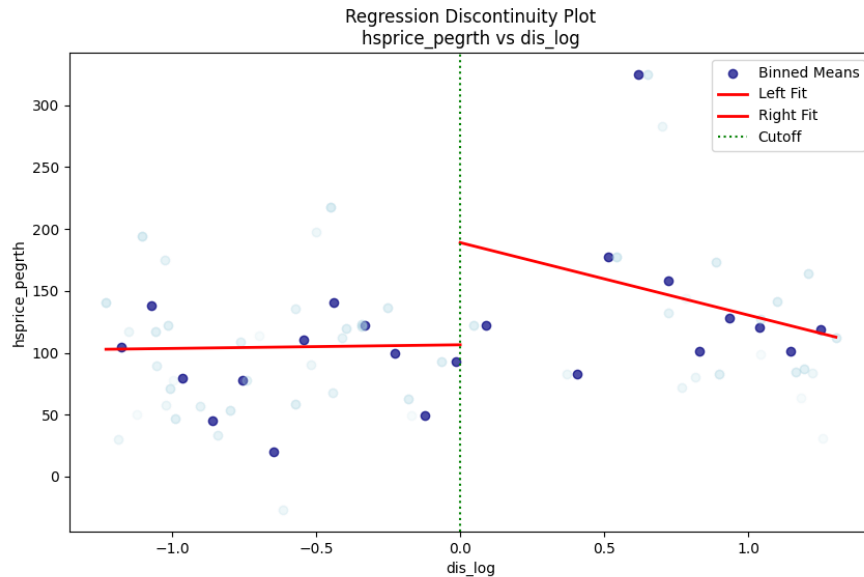*Regression Discontinuity between Distance to Border and GDP in Secondary Industries*

**Figure 4**

*Regression Discontinuity between Distance to Border and Housing Price Growth Rate*



Figures 3 and 4 illustrate the GDP in secondary industries and average housing price growth rate separately, where an apparent gap could be observed between strict OCP cities and non-strict OCP cities. This could be explained by the loss of labour force, where strict OCP regions will have a lower population growth rate over time, which lowers the labour force supply. This matched with the time span of the dataset; the first few generations born under OCP were already at working age. Besides, the secondary GDP in cities with less strict OCP have relatively stable distribution over distance to the border; strict OCP cities have a sharp decreasing pattern as distance to the border increases by contrast. The same pattern could be observed between distance to border and housing price. Although this pattern seems illogical, the main cause is the population movement from a less strict OCP region to a strict OCP region. This will be explained by the price level data below.

**Figure 5**

*Regression Discontinuity between Distance to Border and CPI(Base 2004)*
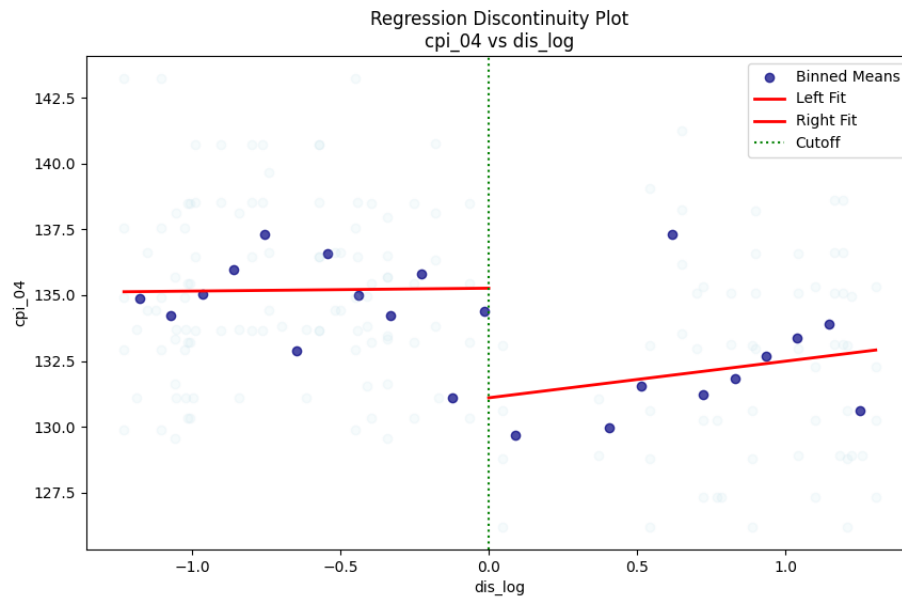


Furthermore, it is clear that the consumer price index in strict OCP regions is significantly lower than in non-strict regions, based on Figure 5. This illustrates the potential population movement from a non-strict region to a strict OCP region. Because of the collective effect of lower living costs, lack of labour supply, less competition and higher quality of education for children, people started moving to strict OCP regions on a vast scale that mainly focuses on border cities where they can easily commute back to their hometowns. As the population in border cities in strict OCP regions grows, the labour-intensive secondary industry output increases. This is also the reason why both the housing price growth rate and industry output have diminishing patterns from the border to the center of the region.

**Placebo test with Two-Child Policy**

**Table 2**

*Two-Child Policy RDD Placebo Test*

| Dependent Variables | St.Err. | t-value | p-value | [95% Conf interval] | |
|---|---|---|---|---|---|
| scnd_gdp | 9.1492 | 4.503 | 0.044 | 0.238 | 18.061 |
| cpi_04 | -4.0698 | 1.079 | 0 | -6.206 | -1.934 |
| dvrcecs_setl_prov | -24450 | 8369.045 | 0.004 | -41000 | -7888.554 |
| dvrcejdge_no_prov | -8502.3399 | 2792.597 | 0.003 | -14000 | -2975.873 |
| open | 0.0032 | 0.001 | 0.014 | 0.001 | 0.006 |
| hsprice_pegrth | 18.2596 | 50.232 | 0.717 | -81.147 | 117.667 |

*** p<.01, ** p<.05, * p<.1

To confirm that our RDD design does capture the unique causality between OCP strictness and the long-run variation of outcome variables, we run a placebo test by specifying the model to capture the effectiveness of the Two-Child Policy (TCP) instead. According to our specification and the nature of spatial RDD, such variation of outcome variables should only happen when we switch between provinces with different strictness of OCP, and hence, when the TCP replaces the OCP as a national policy without any heterogeneity of strictness, we should not observe the same effect significantly. Empirically, we switched the time window to after 2018, when the TCP started. Not surprisingly, we do not see any significant results, but the CPI in 2004 values, which could come from the long-term effect of population shrink after OCP, has not faded even when the TCP has kicked in. Figure 6 below is an example that shows the closed gap at the cutoff for House Price Growth Rate, the counterpart of Figure 6.

**Figure 6**

*Placebo Regression Discontinuity between Distance to Border and Housing Price Growth Rate*
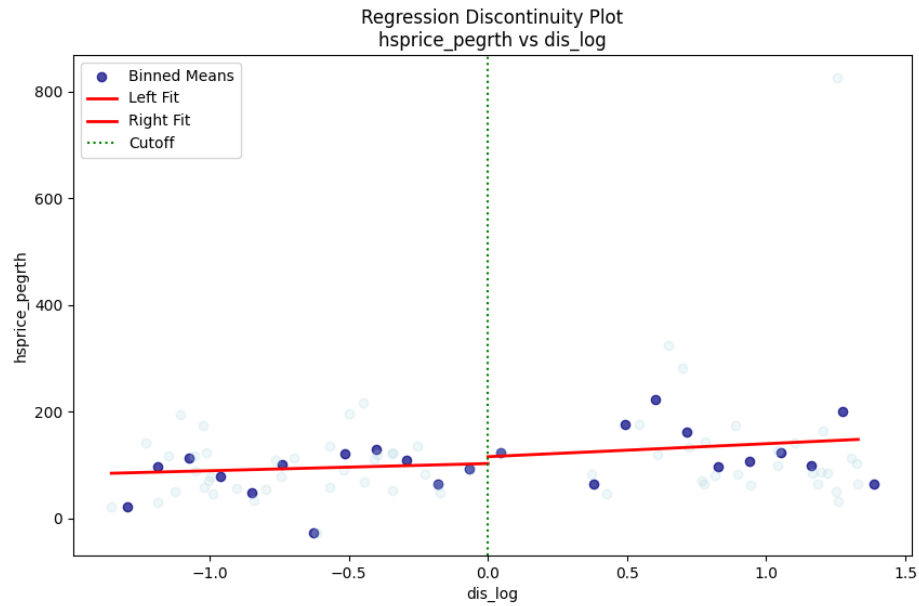


**Conclusion**

The sense of family and family per se units Chinese more than any other part of the world, and the One-Child Policy (OCP) indeed significantly shocked the lives of many. In our research, we find out the long-term effect of the strictness of OCP and the exploitation of the natural province border using Regression Discontinuity Design, which enables us to interpret the result causally. We see that the strictness of OCP can reduce the number of divorces, possibly through lower financial and time burdens, and the lower price it brings could motivate population movement across regions. Furthermore, the limitation of this research should be considered; the data access

restrictions limited our research to administration level 3 (City Level) in China, especially on the identification of 'Bordered Regions'. Hence, our further study will dive into the deeper causes of these factors we observed using qualitative evidence, such as interviews. At the same time, future studies should focus on a finer spatial resolution and research county-level data for a more subtle and accurate treatment effect.

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