Prior to 2011, every low-income renter in the city of Dallas, Texas received a flat Fair Market Rent (FMR) subsidy S_0 that was paid directly to the landlord. (Thus, the renters could not spend less than S_0 on rent.) The city was concerned that many low-income renters chose to live in dangerous neighborhoods with poor-quality schools. Starting in 2011, the city switched to a quality-linked rent subsidy, $S_1(Q)$. For neighborhoods with average quality $\bar{Q}$, the subsidy remained the same. For high-quality neighborhoods (safer, better schools, etc.) with $Q > \bar{Q}$, it increased the subsidy, and for low-quality neighborhoods (less safe, worse schools) with $Q < \bar{Q}$, it lowered the subsidy. For simplicity, assume that $S_1(Q)$ is a linear subsidy. That is, $\frac{dS_1 Q}{dQ} = \alpha > 0$ with:

$S_1(Q) = 0$ if $Q = 0$

$S_1(Q) < S_0$ if $Q < \bar{Q}$

$S_1(Q) = S_0$ if $Q = \bar{Q}$

$S_1(Q) > S_0$ if $Q > \bar{Q}$

Collinson and Ganong (2018) analyzed the effect of the quality-linked rent subsidy on the quality of neighborhoods that low-income renters chose. Because the policy was not randomly assigned to individual renters, Collinson and Gangong used nearby Fort Worth, Texas as a comparison city for Dallas. The figure below provides key data from their study. The x-axis in this figure is time (in years) and the y-axis is the average quality of neighborhoods that low-income renters in Dallas and Fort Worth chose each year. Higher values correspond to higher-quality neighborhoods.
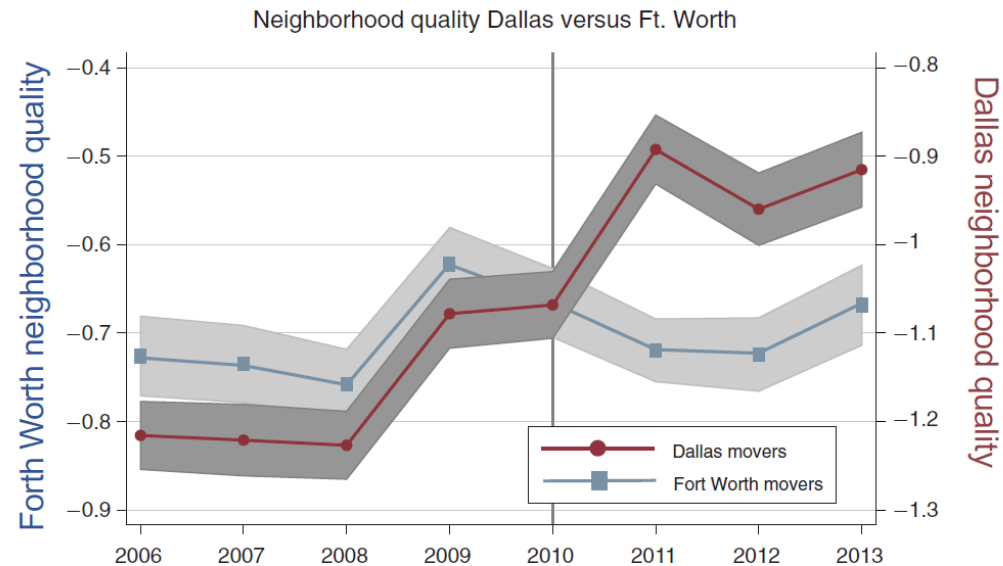
FIGURE 10. IMPACT OF TILTING: NEIGHBORHOOD QUALITY (TIME-SERIES)

Notes: In 2011, Dallas replaced a single, metro-wide FMR with ZIP code-level FMRs, raising rent ceilings in expensive neighborhoods and lowering rent ceilings in cheap neighborhoods. We construct a neighborhood quality index as an equally weighted sum of tract-level poverty rate, test scores, unemployment rate, share of kids with single mothers, and violent crime rate. The index is normalized to have mean zero and unit standard deviation with respect to the entire Dallas metro area. The above figure plots the average neighborhood quality for movers in each year in the Dallas metro area and the Fort Worth metro area. The left vertical axis is the quality level of Fort Worth movers, the right vertical axis reports the quality level of Dallas movers, and both axes share the same scale.

4.1

5.0/5.0 points (graded)

Let Y_{jt} equal the average neighborhood quality of renters in city j ∈ (D,F) in year t ∈ (2010,2011). Let T* equal the causal effect of the policy on the quality of neighborhoods chosen by Dallas renters, and $\hat{T}$ equal the difference-in-difference estimate of T*.

Fill in the blanks. $\hat{T} = (E[Y_{D,2011}] - \underline{\hspace{1cm}}) - (E[Y_{F,2011}] - \underline{\hspace{1cm}})$

○ $E[Y_{F,2010}]$; $E[Y_{D,2010}]$

◉ $E[Y_{D,2010}]$; $E[Y_{F,2010}]$

✔

Explanation

$\hat{T} = (E[Y_{D,2011}] - E[Y_{D,2010}]) - (E[Y_{F,2011}] - E[Y_{F,2010}])$

Submit   You have used 1 of 1 attempt

ⓘ Answers are displayed within the problem

4.2

5.0/5.0 points (graded)

Under what assumptions is $\hat{T}$ a valid estimate of T^*? Select all that apply.

☑ Parallel trends assumption.

☑ Stable Unit Treatment Value Assumption (SUTVA).

☐ Exclusion restriction

✔

Explanation
The two assumptions are (1) the parallel trends assumption and (2) SUTVA. Parallel trends require that outcomes in Dallas would have evolved similarly to those in Fort Worth in the absence of the policy. SUTVA requires that the outcomes in Dallas and Fort Worth depend only on its own treatment assignment, not on other areas' treatment assignments.

| Submit | You have used 1 of 1 attempt |

ⓘ Answers are displayed within the problem

4.3

2.5/5.0 points (graded)
Fill in the blanks. In the graph above, look again at the average neighborhood quality of rentals in Dallas and Forth Worth. The information from the years 2006-2009 [increases ▽] ✔ Answer: increases your confidence in the validity of $\hat{T}$ as an estimate of T*, and the information from the years 2011-2013 [decreases ▽] ✘

Answer: is not informative about your confidence in the validity of $\hat{T}$ as an estimate of T*.

Explanation
Parallel trends during the pre-treatment period from 2006-2009 increase confidence in the validity of the estimate, which requires parallel trends in counterfactual outcomes following treatment. On the other hand, information from the years 2011-2013 is not informative about the validity of the estimate as a causal effect. The observed trends are a mixture of causal effects and potential confounding trends, and there is nothing in the data during this period alone that allows us to distinguish between the two.

ℹ Answers are displayed within the problem

4.4

0.0/5.0 points (graded)

Fill in the blank. Assume that when Dallas announced its new quality-linked policy in 2010, many low-income renters moved from Fort Worth to Dallas to take advantage of the higher rent subsidy. This ____ your confidence in the validity of $\hat{T}$ as an estimate of T*.

○ increases

○ decreases ✔

◉ is not informative about ✖

Explanation:

This decreases confidence in $\hat{T}$ as an estimate of the policy's causal effect. If many low-income renters moved to Dallas in anticipation of the policy, then 2010 "pre-treatment" outcomes were affected by the policy itself. This is a violation of SUTVA.

Submit   You have used 1 of 1 attempt

ⓘ   Answers are displayed within the problem

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