Terrorism and attitudes towards minorities: the effect of the Theo van Gogh murder on house prices in Amsterdam

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Research question

This paper tries to investigate the impact of house prices in immigrant areas in the year after the Van Gogh murder in Amsterdam

Motivation:

- Does bad news have an impact on the property prices?
- Van Gogh murder was an important unexpected event
- Hedonic market approach
- Comparison between labor economics versus housing market

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Outline of Talk

The following topics will be discussed:

1. Research design
2. Data
3. Main results
4. Robustness checks and extensions

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Definition of neighborhoods:

- Amsterdam is divided into 90 different neighborhoods.
- Neighborhood is defined as type I when the number of immigrants from Turkey and Morocco is higher than 25 % (treatment group in baseline analysis).
- Otherwise we have a type II neighborhood (control group in baseline analysis).

Estimation strategy

Basic equation

$$p_{it} = \alpha + \beta x_i + \nu_{J(i)} + \mu(t) + \lambda(t) d_{J(i)} + \xi_i + \varepsilon_{it}, \qquad (1)$$

with

- p_{it} is the log price of house i in week t
- $J(i)$ maps the house into a neighborhood
- x_i contains characteristics of the house
- ν_j: neighborhood fixed effect
- $\mu(t)$ contains the time effects for all neighborhoods
- $\lambda(t)$: additional time effects for type I neighborhoods
- $d_{J(i)}$ is a dummy for a type I neighborhood
- ξ_i is a house fixed effect
- ε_{it} is the error term.

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Estimation strategy

Direct estimation is not possible

- Impossible to identify neighborhood effects ($\nu_{J(i)}$) and the aggregation of individual effects (ξ_i).
- Abowd, Kramarz, Margolis (1999) in labor market context observe same workers in different jobs.
- Here, no mobility of houses between neighborhoods

Estimation strategy

We estimate:

$$p_{jt}^* = \alpha + \beta x_{jt}^* + \nu_{jt}^* + \mu(t) + \lambda(t) d_j + \varepsilon_{jt}^*. \quad (2)$$

- We cannot allow for time varying neighborhood effects (i.e. ν_{jt}^* is constant)
- How to specify $\mu(t)$ and $\lambda(t)$
- Most flexible is a fixed effects model, i.e. $\mu(t) = \mu_t$ and $\lambda(t) = \lambda_t$ for $t = 1, \ldots T$

Estimation strategy

Alternative:

- Use polynomials which can differ for the affected and non-affected periods:

$$\mu(t) = \pi(t)(1 - d_{1t}) + \omega(t)d_{1t}, \quad (3)$$

$$\lambda(t) = \zeta(t)(1 - d_{1t}) + \eta(t)d_{1t}, \quad (4)$$

where $\pi(t), \omega(t), \zeta(t)$ and $\eta(t)$ are polynomials and d1t is a dummy variable that indicates whether the period of analysis is after the murder (after week 45 of 2004)

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Heteroscedasticity

There are two sources for heteroscedasticity

1. There are different absolute price levels per neighborhood
   - Can be reduced by using logs
2. The number of listed houses per neighborhood varies.
   - We use generalized least squares to correct for this source (weighting)

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Dataset I

- Funda website
- 70 percent of houses for sale are posted at this website
- Stock of about 3700 houses at every moment in time
- Period from week 17 (6) in 2004 to week 6 in 2006
- 20,743 house observations
- 328,449 price observations
- Variables: address, square footage, type of house, attachment of garage

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Dataset II

- Data from statistics council in Amsterdam
- Division of 90 different neighborhoods
- Neighborhood typically has 8,000 inhabitants
- Information about population, ethnic origin, crime rates, income etc.
- Type I neighborhood: neighborhoods with over 25 percent Dutch Moroccans or Dutch Turkish
- Type II neighborhoods: the rest (in baseline)
- 12 type I, 78 type II neighborhoods

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Dataset III

- Data from Cadastre and Public Register Agency (Kadaster)
- All transactions in the years 2004-2005 in Amsterdam
- 16,384 observations
- We can match 10,479 of them with Funda dataset
- Variables such as price, date, original address of buyer, destination address of seller, surnames of buyers and sellers

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Descriptive statistics - all neighborhoods

Variable	Number of obs.	Mean	Standard deviation
All neighborhoods			
Number of neighborhoods	90		
List price	20148	290487	236261
Apartment	20148	0.85	
Square footage	20148	1050	655
Garage	18475	0.028	
Duration listed	20148	20.36	18.71
Percentage of muslims	20148	11.70	
Income per individual	20148	20471	4459
Crime rate	20148	0.148	0.268

Descriptive statistics - type I neighborhoods

Variable	Number of obs.	Mean	Standard deviation
Type I neighborhoods			
Number of neighborhoods	12		
Price	2497	175732	56533
Apartment	2497	0.93	
Square footage	2497	804.6	265.4
Garage	2278	0.018	
Duration listed	2278	20.83	20.34
Percentage of muslims	20148	37.82	
Income per individual	2278	16480	918
Crime rate	2278	0.087	0.014

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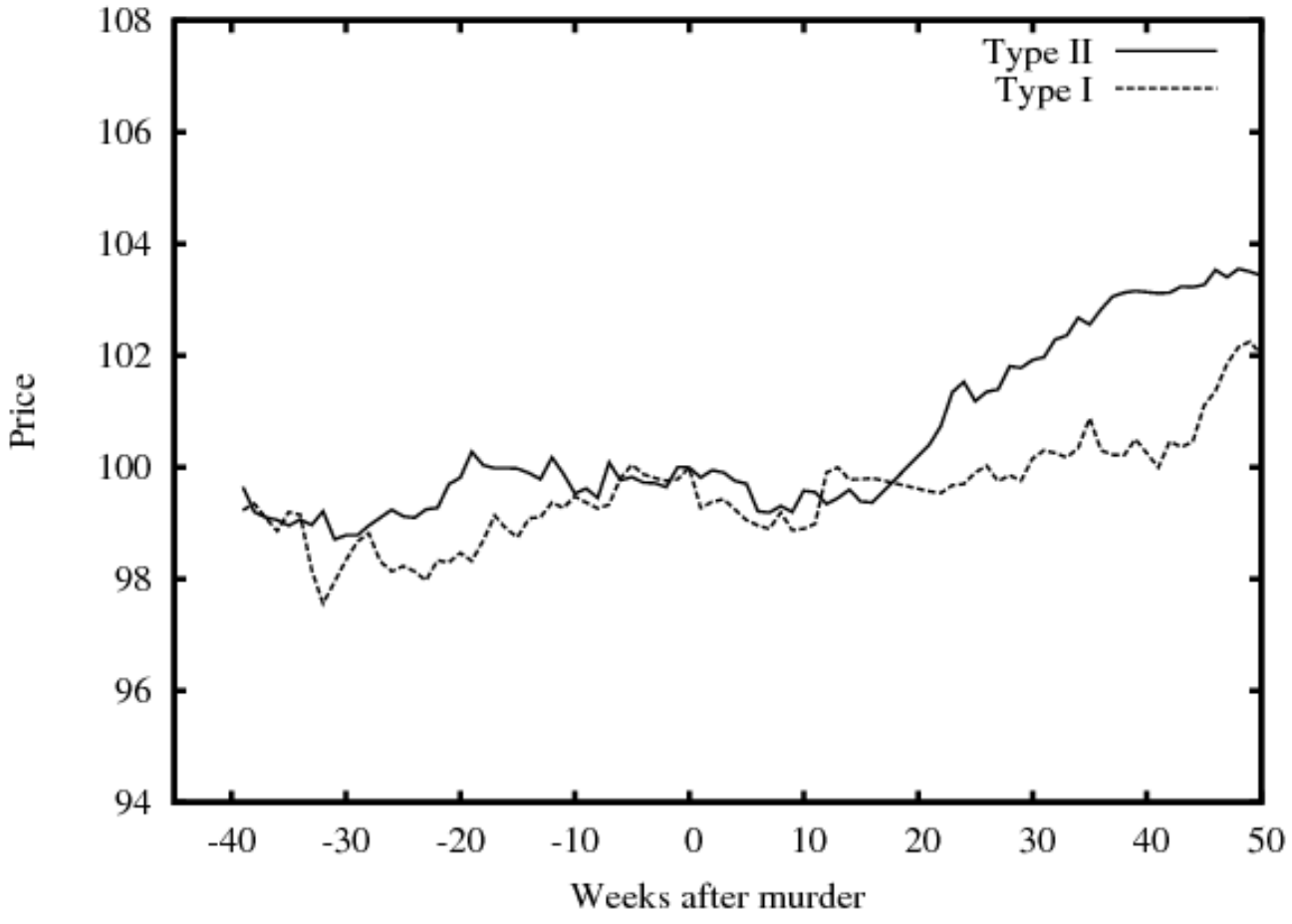
Descriptive statistics - type II neighborhoods

Variable	Number of obs.	Mean	Standard deviation
Type II neighborhoods			
Number of neighborhoods	78		
Price	17651	306721	247260
Apartment	17651	0.839	
Square footage	17651	1084	686
Garage	16197	0.029	
Duration listed	17651	20.16	17.92
Percentage of muslims	20148	7.62	
Income per individual	17651	21037	4472
Crime rate	17651	0.157	0.285

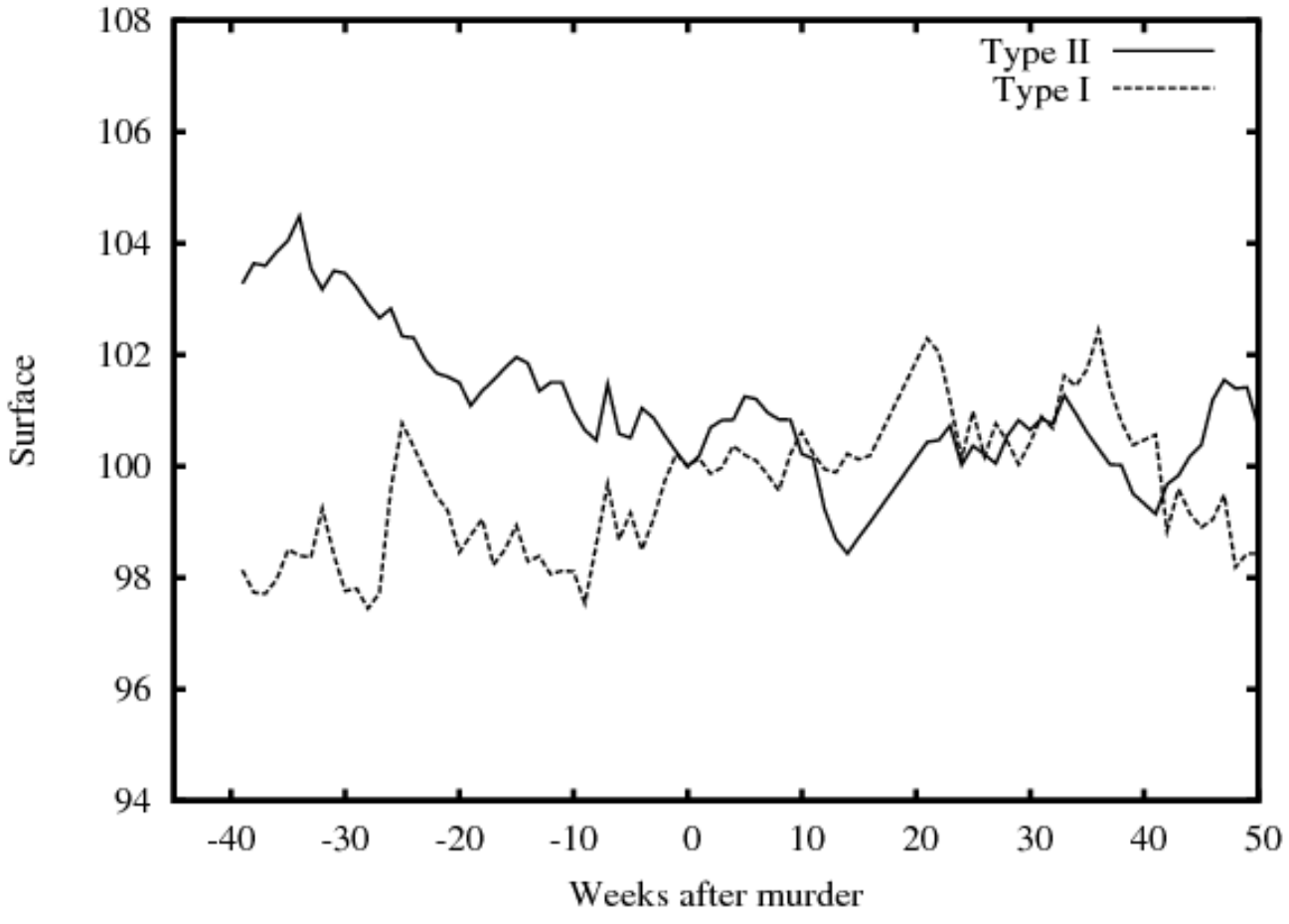
Descriptive statistics

Price per square foot



Descriptive statistics

Average square foot for listed houses

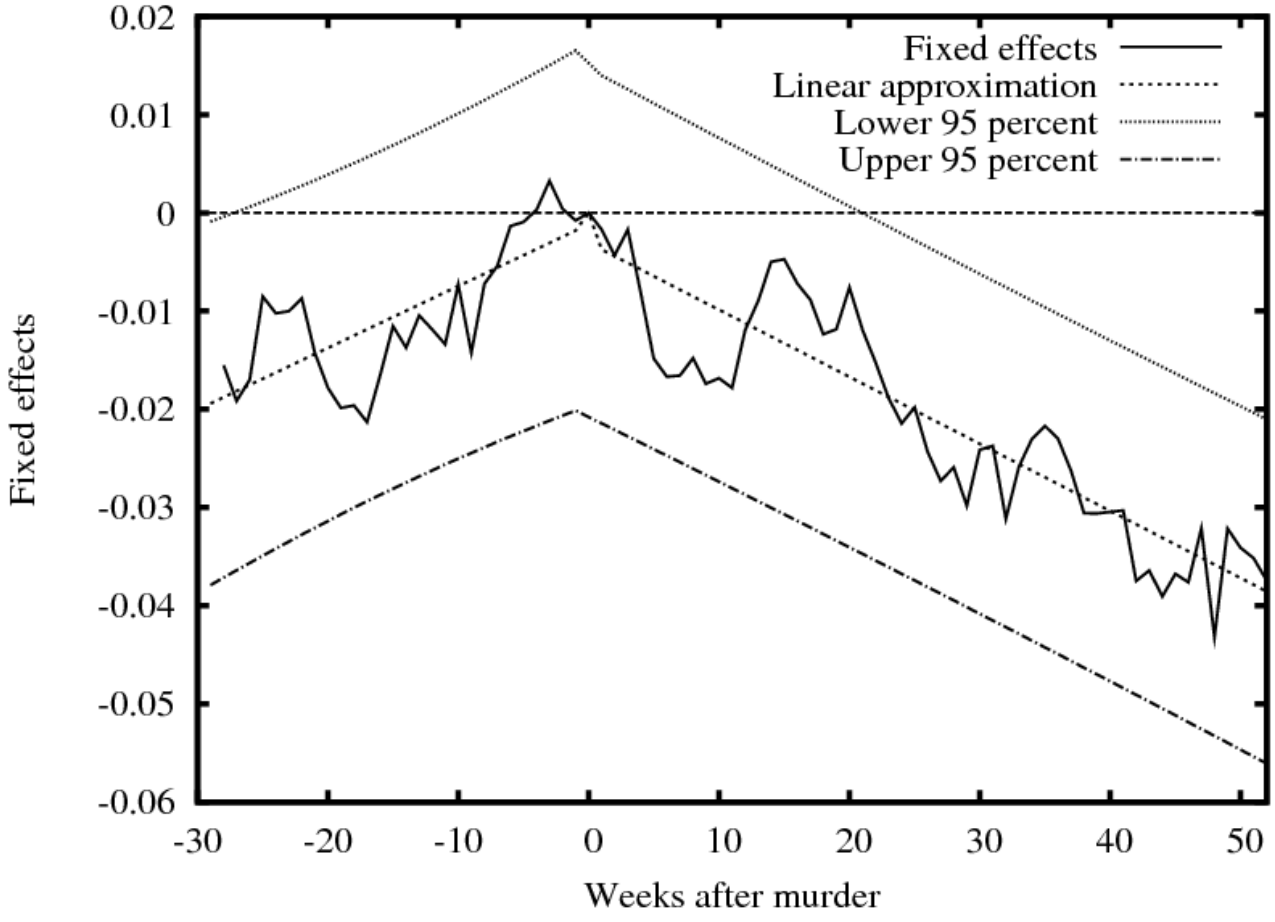


Baseline results - DiD estimator

	Constant	Linear	Quadratic
Constant	-0.024	-0.003	-0.006
	(0.009)	(0.009)	(0.009)
t ($\times 100$)	·	-0.068	-0.054
		(0.007)	(0.027)
t^2($\times 10000$)	·	·	-0.023
			(0.043)

Baseline results

The linear model



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Fraction of Muslims in a neighborhood

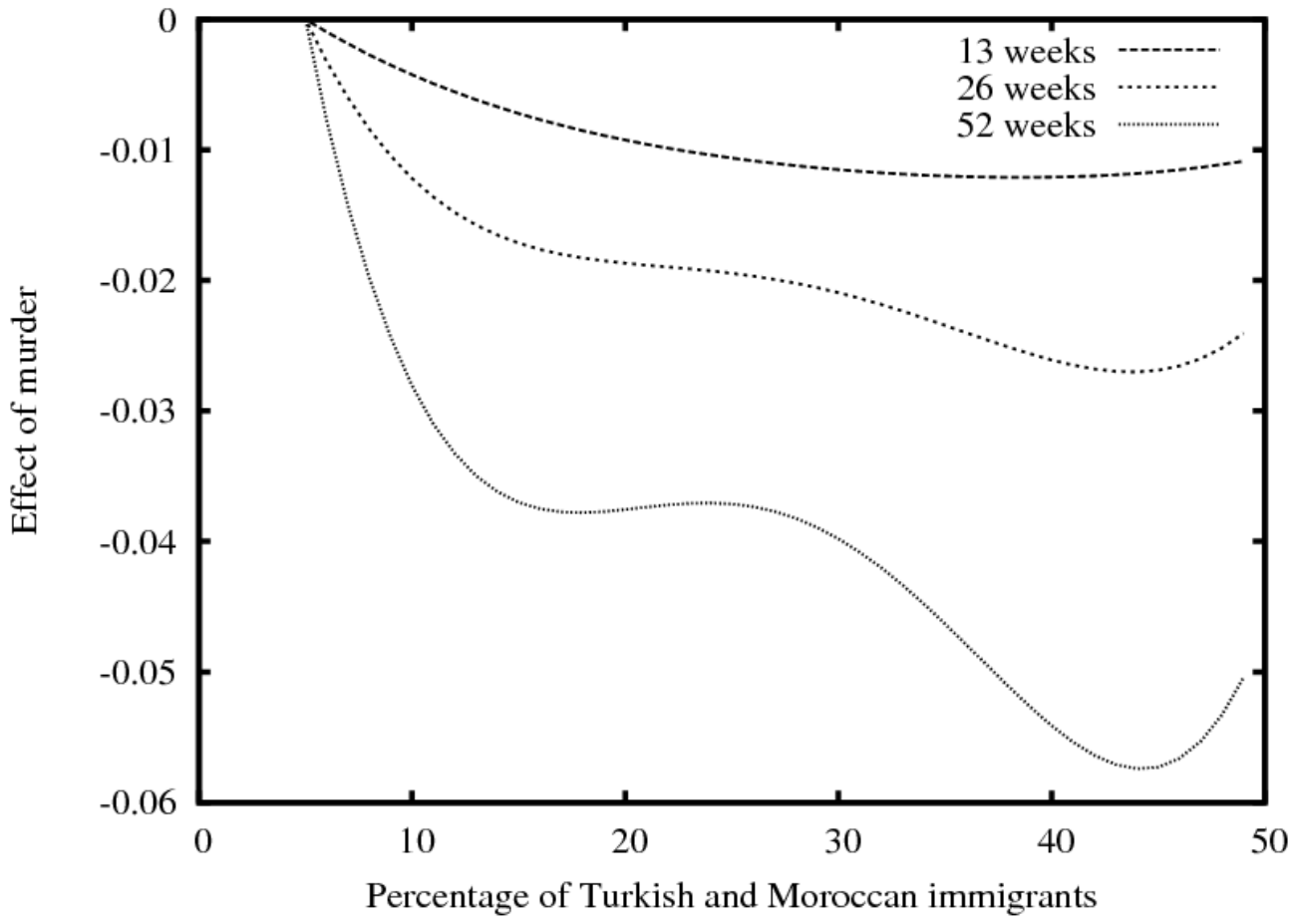
Alternative estimation method

$$p_{jt}^{*} = \alpha + \beta x_{jt}^{*} + \nu_{j}^{*} + \mu(t) + \lambda(t)\gamma(s) + \varepsilon_{jt}^{*}, \tag{5}$$

with s the fraction of Turkish and Moroccan immigrants in a neighborhood.

Fraction of Muslims in a neighborhood

The impact of the murder for different thresholds



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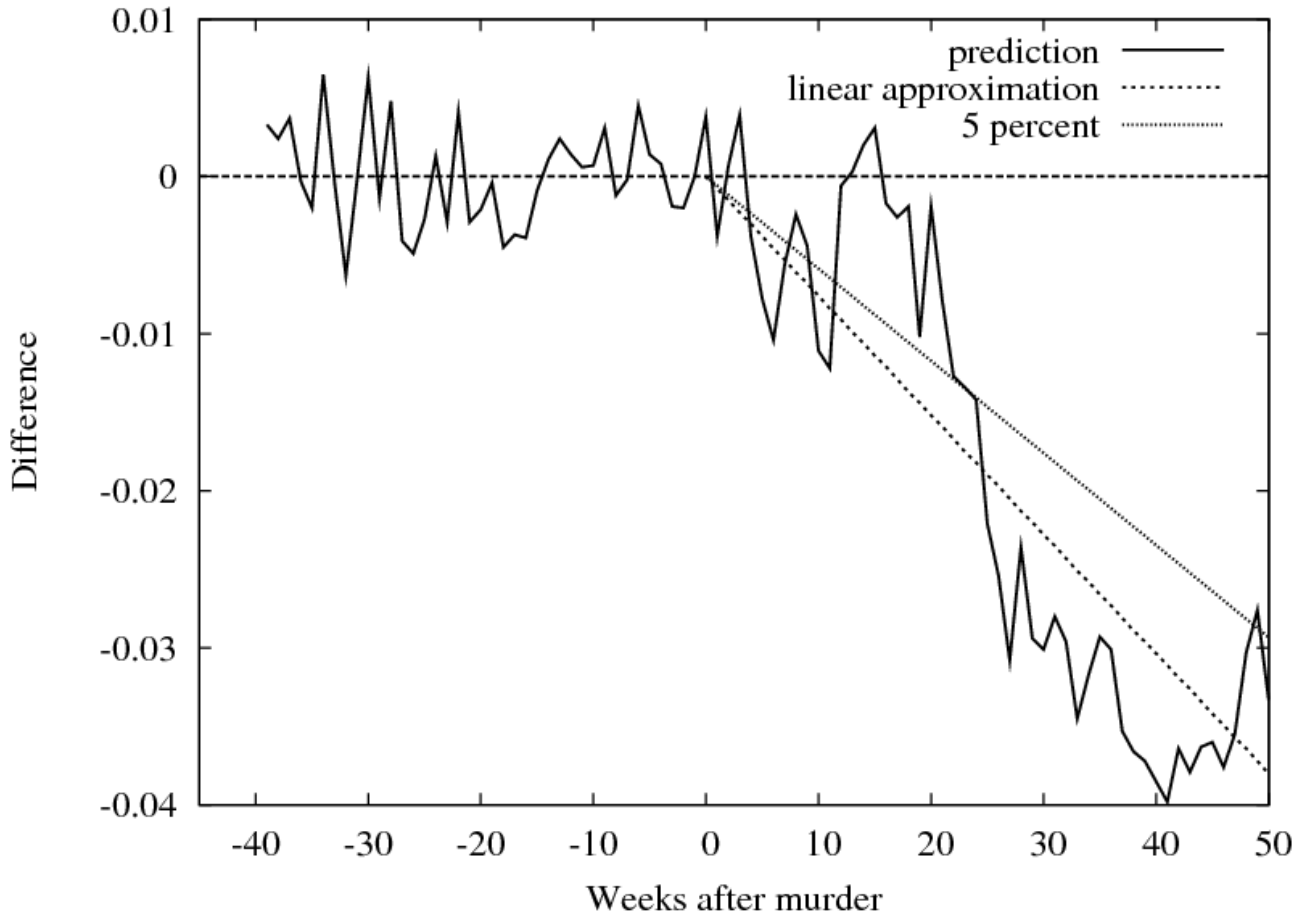
Synthetic control groups

- Originally developed in Abadie and Gardeazabel (2003), Abadie and Dermisi (2008) and Abadie, Diamond and Hainmueller (2007).
- For each type I neighborhood we construct a synthetic control group from a weighted average of type II neighborhoods.
- The weights are chosen such that the house prices of the synthetic control group match the pre-trend of our treatment type I neighborhood as good as possible.
- Specifically, we minimize the mean squared prediction error (MSPE) before the date of the murder.

Synthetic control groups

Estimated trend using synthetic control groups



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Segregation

- If valuations for houses in type I and type II neighborhoods diverge after the murder because of ethnic preferences, we should see this in the ethnicity of buyers and sellers.
- We had research assistants from both countries to identify whether the surnames of buyers and sellers were of Turkish or Moroccan origin.

Segregation

	Total	Before	After	T-value of difference
Type I neighborhoods				
Buyers	9.29	8.12	9.87	1.88
	(0.45)	(0.74)	(0.56)	
Sellers	4.25	5.14	3.75	-1.64
	(0.39)	(0.71)	(0.46)	
Type II neighborhoods				
Buyers	1.97	1.88	2.04	0.31
	(0.26)	(0.41)	(0.35)	
Sellers	0.59	0.81	0.42	-1.16
	(0.16)	(0.29)	(0.19)	

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Robustness checks

We perform the following robustness checks:

- Sticky list prices
- Serial correlation
- Changes in the supply of houses and in the hedonic prices of housing attributes
- Changes in average discount
- Duration analysis