

Tech City: origin stories, policy fixes, policy impacts

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Innovation Districts: Political Economy, Aesthetics and the Concept of Place
UCL East, 26 April 2023

Overview

- **East London is a key part of the London tech ecosystem**
 - A cluster in Shoreditch dominated by digital content (media, design, marketing, web etc.) which grew ‘organically’ for years
 - Big intervention in 2010: building a proto-innovation district, Tech City
 - Part of a bigger project to boost UK tech, cf. ‘Unicorn Kingdom’ campaign
- **What I’m going to talk about:**
 - Origin stories
 - Policy mix and implementation
 - Economic impacts
- **I’ll draw on three papers:** Nathan and Vandore (2014, Environment and Planning A); Nathan, Vandore, Voss (2019, Journal of Economic Geography); Nathan (2021, Research Policy)

London's Tech ecosystem

Greater London

Tech sector performance 1

76,660

Number of digital tech firms

14%

Digital % of firms

589,730

Employment

9%

Digital employment

£156bn

Turnover

7%

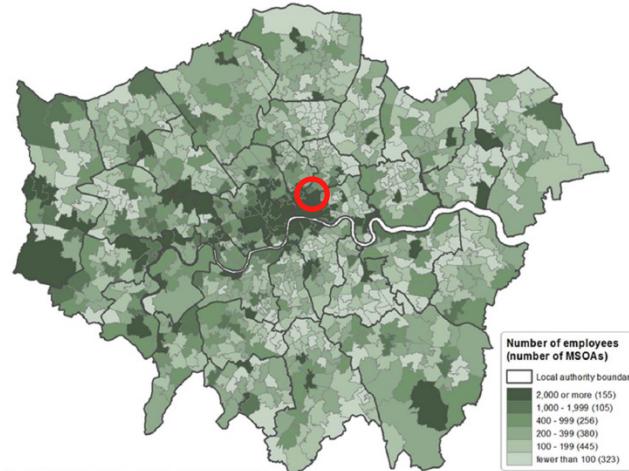
Digital % of turnover

55

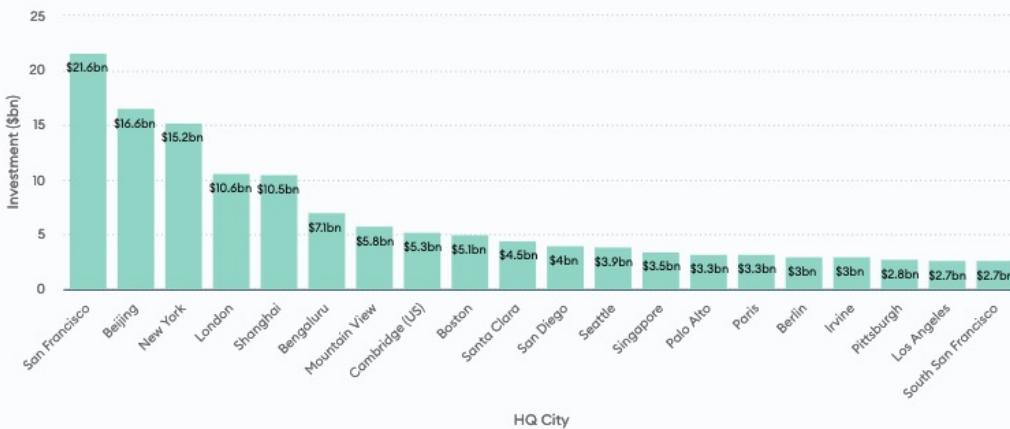
Unicorns

82

Future unicorns



VC investment in tech companies by city (2020)



Sources:
Tech Nation
(2021)
SQW (2015)

Here Be Startups

- City / Central London fringe
- Industrial history: furniture, textiles, jewellery, printing, design
- Post-WW2: decline, severe de-industrialisation
- 1980s: new business services; creative industries; loft-dwellers
- 1990s: ‘new media’ scene, night time economy
- **Branching:** ‘new media’, design industries moves east from Soho and Clerkenwell
- **Dotcoms and post-2001 crash** survivors (some, millionaires)
- **Jobs at the BBC**, especially on the first BBC website
- **Haddock mailing list**
[<http://www.haddock.org>]
- Early UK **blogging** scene ['weblogs', livejournal etc.]
- **Resonant site:** Old St roundabout

Silicon Roundabout, an insider's imaginary

Silicon Roundabout

2,592 views

SHARE

Untitled layer

- last.fm
- Moo
- Trampoline Systems
- Redmonk
- Skimbit
- Techlightenment
- Kizoom
- S&W Schulze & Webb
- LShift / Cohesive FT
- Poke London
- Consolidated Independent
- Dopplr
- AMEE
- Songkick
- IDEO
- Ket Lai

Made with Google My Maps

Matt Biddulph @mattb

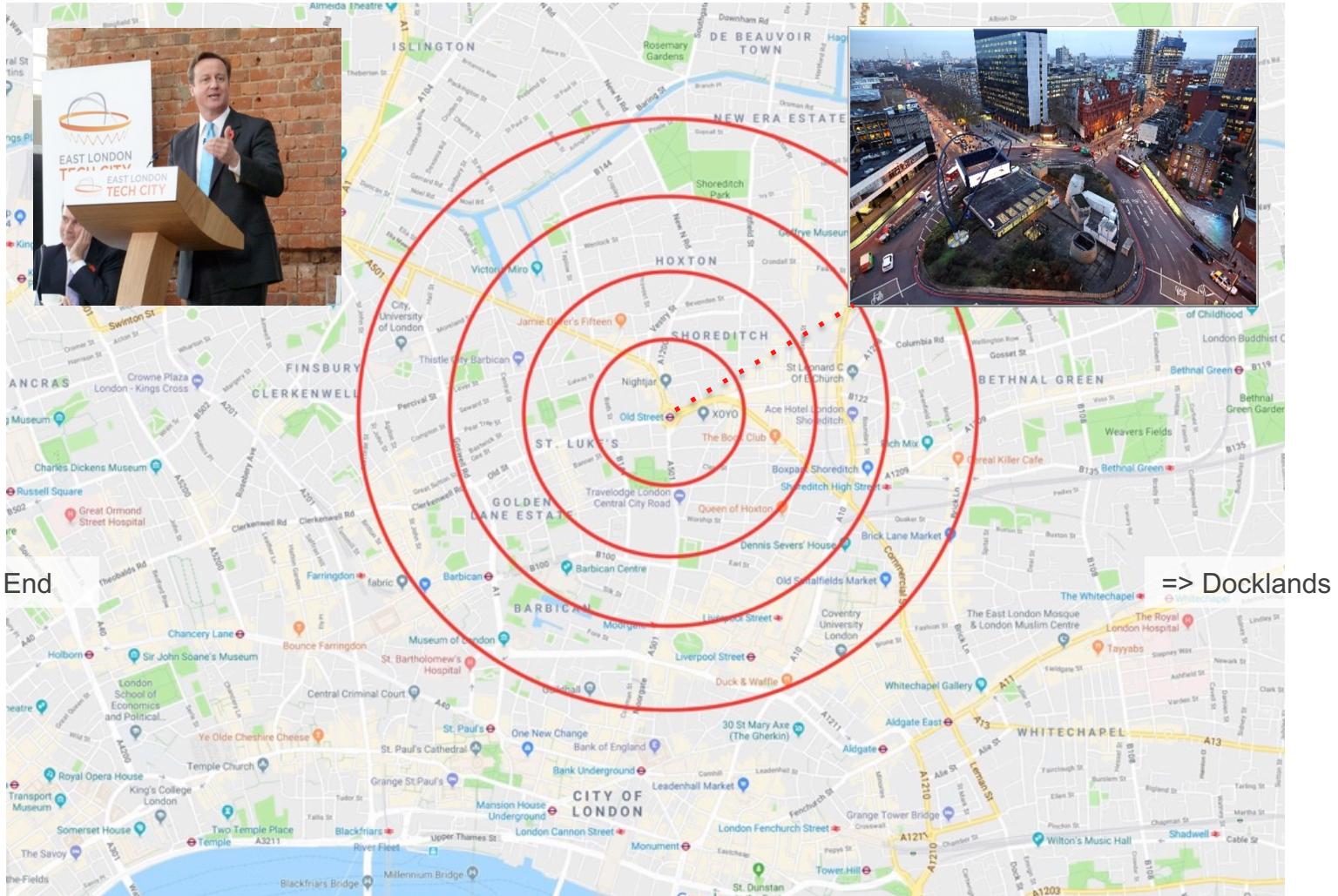
"Silicon Roundabout": the ever-growing community of fun startups in London's Old Street area

7:12 AM - 23 Jul 2008

8 Retweets 35 Likes

Source: <http://twitter.com/mattb> (2008). Map accessed 25 November 2015

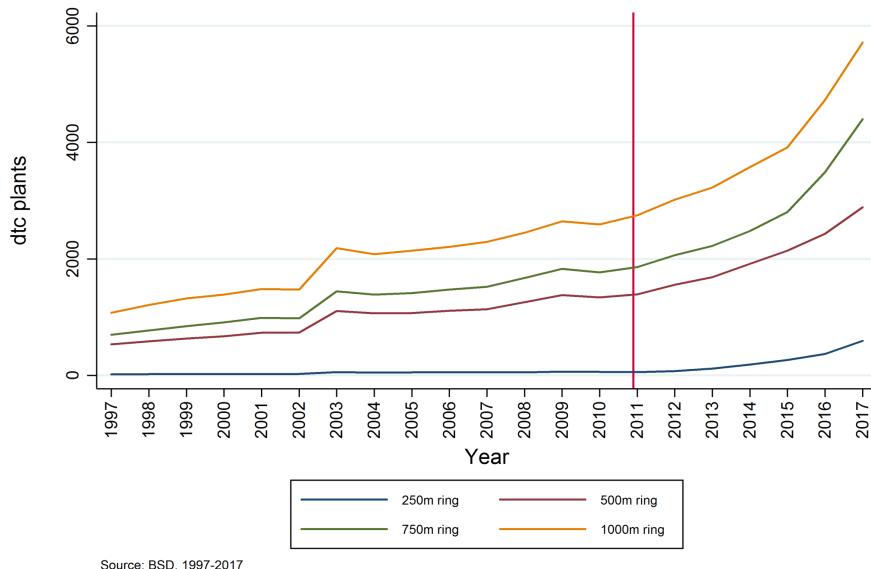
Tech City, a policy imaginary



Red lines = 250m rings from Old St roundabout. In 2010 there were c. 2,800 tech firms in the area covered by the outermost circle, 1km from the roundabout.

A success story?

Tech firm counts, 1997-2017



Business

Shoreditch office rents to rise as Tech City grows

JOANNA BOURKE | Tuesday 13 February 2018 12:52 | 0 comments



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The Evening Standard



Office rents in Shoreditch are forecast to rise between 2018 and 2020 Getty Images

The boom in digital companies spending on digs in Tech City shows no sign of abating, with Shoreditch set to lead the way in the office rental market.

The east London area will achieve the strongest offices rental growth in central London between now and December 2020, a new study from property agent Knight Frank has forecast.



Tech City, the heart of London's tech sector, has become the biggest cluster in Europe over the last three years, growing out of east London to span the entire capital. (GLA, March 2014)

Source: <https://www.london.gov.uk/press-releases-6094>

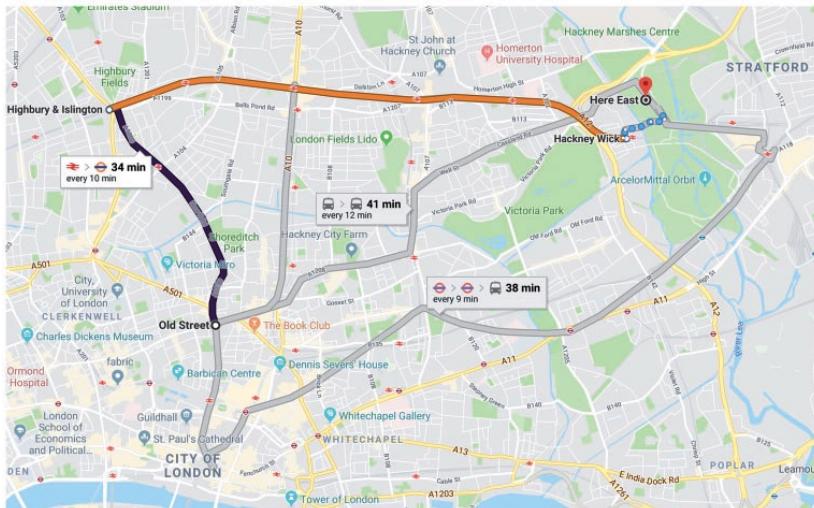
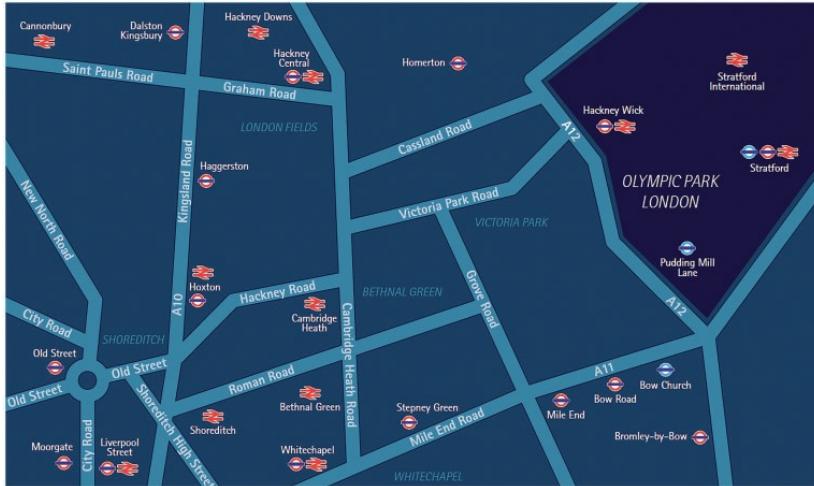
Cluster thinking

- **Positive feedback loops:** Porter (1996, 2000) argues that clusters can be developed by mapping strengths; better firm-firm links; better infrastructure; building up local markets. ...
- Critique: clusters involve **both positive and negative feedback loops** (Duranton 2011, Nathan & Overman 2013):
 - Agglomeration effects: sharing, matching, learning (+)
 - Competition effects: for staff, space, market share (- firms; + cluster?)
 - Crowding effects: rising costs of being in the cluster (-)
- Not obvious what best policy choices are; lots of tradeoffs
- Particular challenges for brand-led programmes

Tech City policy mix

- **Surprise announcement** by David Cameron, Nov 2010
- Big emphasis on place branding / marketing, FDI, business support; very little on workspace, skills / training
 - Focused on Old St area; aim to extend to the Olympic Park
 - Place-branding, marketing for the area
 - Attracting FDI to the area
 - Business support for selected local firms
 - Public-private networking; lobbying central Government
 - Tax breaks for early stage finance [national programme]
 - Delivery body = Tech City Investment Organisation [now Tech Nation]
 - Other players: London boroughs, TfL, OPLC, BIS/BEIS, No. 10, No. 11, other industry bodies, real estate actors

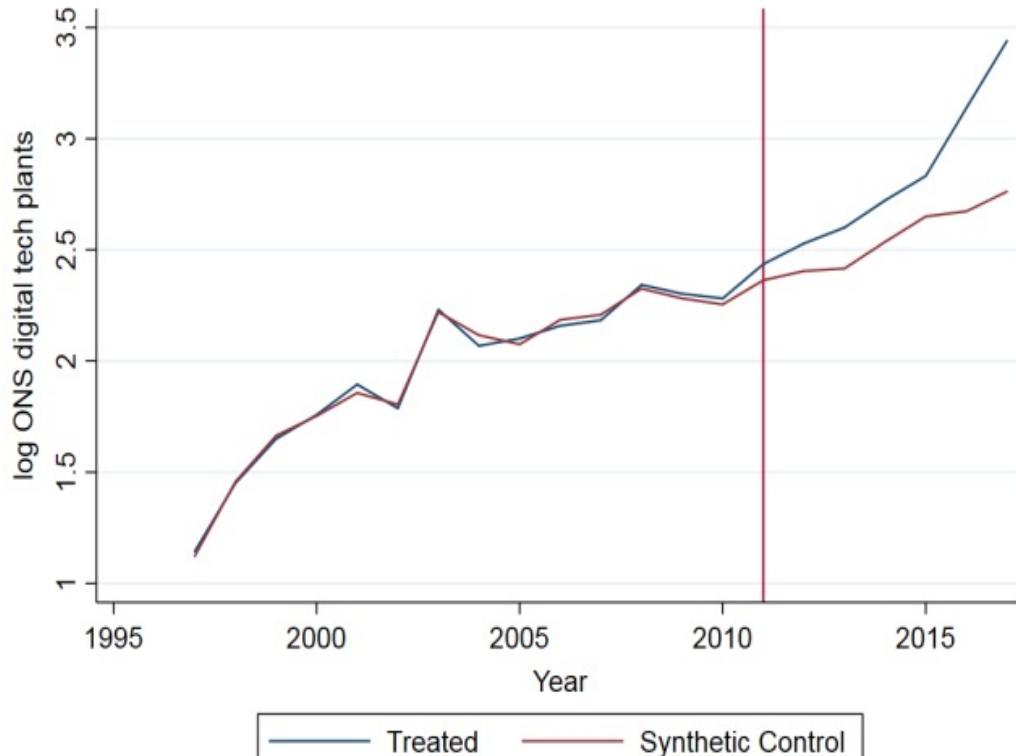
Policy rollout was messy



- Policy spaces vs. actual places
- A case of multispatial metagovernance (Jessop, 2016)
- Resistance – at least initially, from firms in the area

Sources: TCIO (2012); Google Maps (2015)

Testing policy impacts



Blue = change in **actual Tech City area**

Red = change in **synthetic Tech City**

Synthetic Tech City is built from a weighted average of 213 rest-of-London LSOAs selected through nearest-neighbour matching.

Vertical line = policy rollout

Run placebo tests to infer causal effect vs. noise

Source: BSD, 1997-2017

Results: mixed

- **The policy created a bigger, denser cluster**
 - Driven by new entrants > in-movers
 - Some evidence of within-cluster crowding: core-to-edge dispersion
- **Effects on firm performance are at best partial**
 - Incumbents gained sales/worker; entrants did not
 - Rising churn
 - No evidence of additional high-growth firm activity
- **Little added value** – policy largely ‘rode the wave’
 - In 7/10 outcomes tested, changes/year are *smaller* after the policy started, compared to before

Conclusions

- **Building out the cluster** ~ building an innovation district, maybe
 - Heavy place-branding emphasis
 - Assumption it's all win-win
 - Aim: to be 'world-leading'
- **Extremely challenging to actually do this**
 - Fundamental trade-offs involved: not win-win
 - Mobile policy object: policy space vs real place
 - Messy governance
 - Pushback to the brand
 - ... Results are pretty mixed
- Better policy would start from acknowledging limits!

Thanks!

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All the outputs have been granted final clearance by the staff of the SDS-UKDA.

Appendix

What people told us

We live locally. All the firms live locally. We knew we wanted to be here, it made sense ... we knew the area well, knew it was very vibrant, very close to home, lots of cheap space, lots of flexible space ... we were subletting from someone, then from someone else. Then the first person we sublet from sublet from us, then someone else came, then we took the whole space ... then we moved out. [F11]

We looked at lots of places, and there were a couple of companies in this area already, and we moved here because the other companies were here. And you know... the first weekend we were here we went out and got some sandwiches and sat in the park ... and I ran into some friends who worked at [redacted]. And that was, you know we talked about some possible ways we could work together ... [F3]

Source: Nathan and Vandore (2014 EPA), Nathan et al (2019 JOEG)

Tech City's great. I think all of this helps to push the ecosystem generally, because it gets into people's minds ... (E24, C22)

Tech City is what government people call it. I don't think I've heard anyone call it Tech City without sort of air quotes. (E18, C16)

I think the biggest risk to it is that they're ratcheting too many things together. I think if it just concentrated on innovating in East London, or specifically helping tech startups, then everything else would follow.
(E32, C30)

- 
- Proposed redevelopment of Old St roundabout, 2012. £50m budget, renderings by Architecture 00
 - Presented by DC and BJ to a hostile crowd of academic critical urbanists
 - TfL already had their own plans for the roundabout, had not been consulted
 - Design, if built, would have collapsed into Old St tube station

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Research design

- **Setup:** look at cluster size, density, firm performance.
Compare ‘digital tech’ and ‘digital content’ firms [[build](#)] [[desc](#)]
- **Option 1:** compare changes in Tech City area with changes in similar London neighbourhoods (‘difference in differences’).
I use propensity score matching to find control areas
- *Problems:* *control areas aren’t like for like* [[matching](#)], *control areas don’t follow parallel trends pre-policy* [[balancing](#)], *lots of pre-policy buzz* [[anticipation](#)]
- **Option 2:** compare Tech City to a weighted average of similar neighbourhoods (‘synthetic control’) (Abadie et al 2010)

Estimation

- Generalised DID: for neighbourhood i , year t , I estimate:

$$Y_{it} = I_i + T_t + aTC_{it} + \mathbf{X}\mathbf{b}_{it-n} + e_{it} \quad (1)$$

- Synthetic control: ATT for Tech City is given by:

$$a_1 = Y_{1t} - \sum_{i \geq 2} \mathbf{W}_i Y_{it} \quad (2)$$

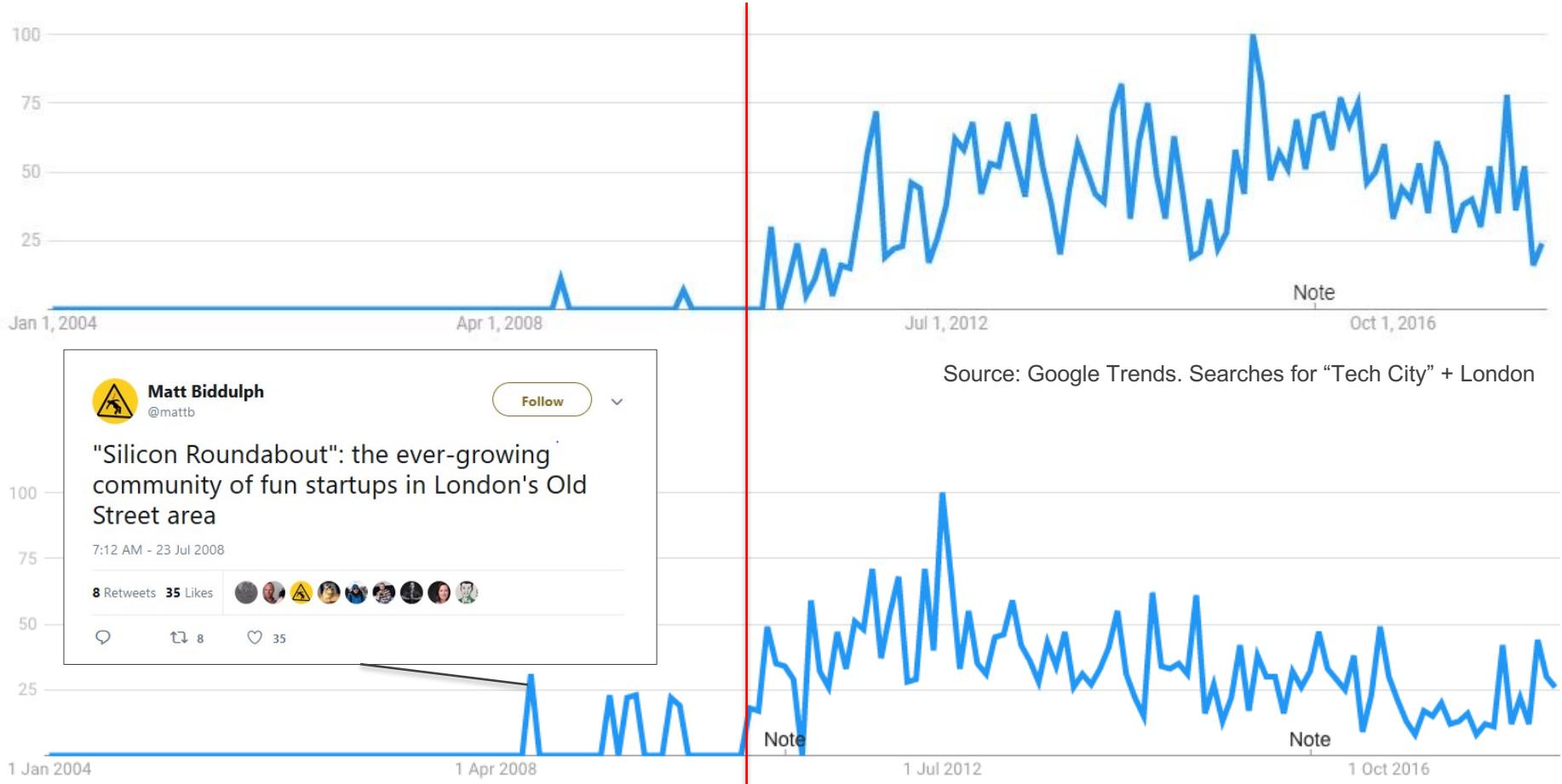
- \mathbf{W} = $ix1$ vector for matched control neighbourhoods (w_2, \dots, w_{i+1}), where $0 \leq w \leq 1$. \mathbf{W}^* minimises prior prediction error:

$$\mathbf{W}^* = \text{Min}(\mathbf{X}_1 - \mathbf{X}_0 \mathbf{W})^\top \mathbf{V} (\mathbf{X}_1 - \mathbf{X}_0 \mathbf{W}) \quad (3)$$

- Various specification tests for \mathbf{V} and \mathbf{X} ...
- Inference via fit-based placebo tests

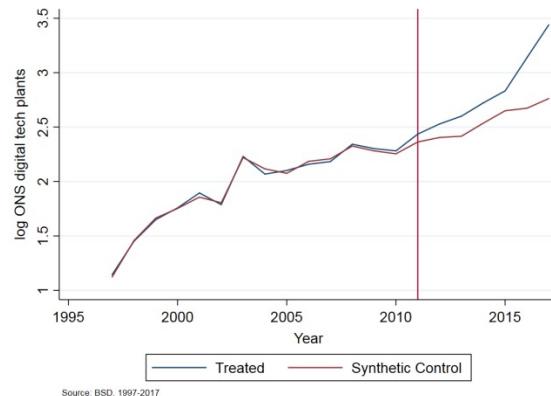
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Pre-policy buzz

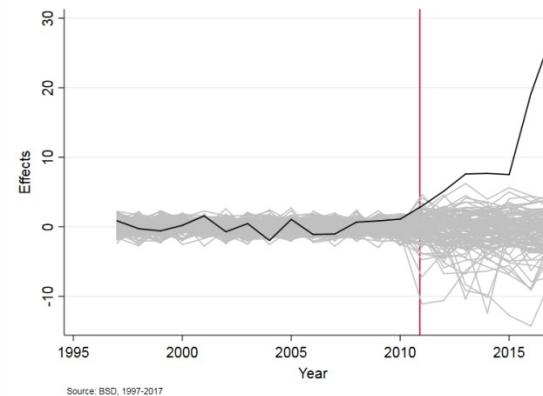


Results: # tech firms

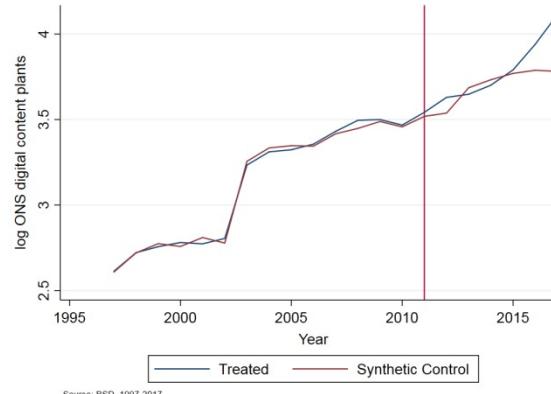
Log digitech firms



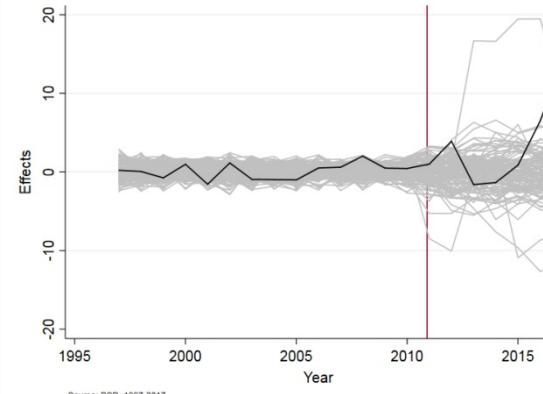
Placebo test, log digitech firms



Log content firms



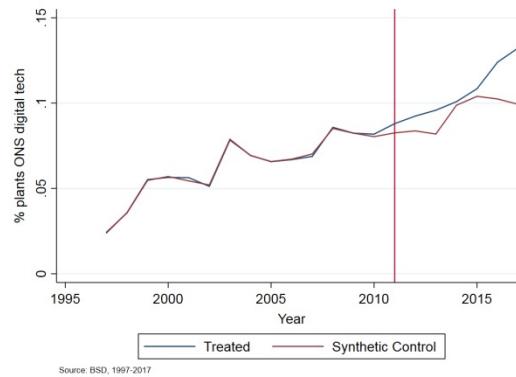
Placebo test, log content firms



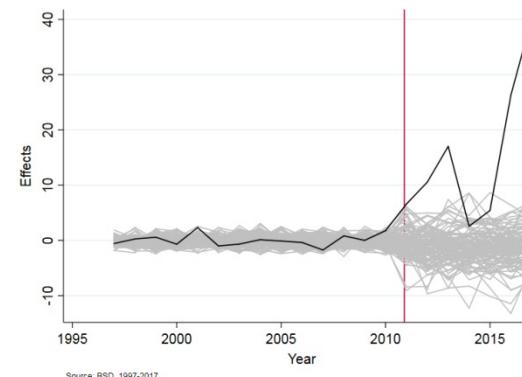
The left column shows outcomes for Tech City LSOAs (blue) vs. synthetic Tech City (red), the no-policy counterfactual scenario. The right column shows precision-weighted effect sizes for Tech City (black) versus 213 placebo units in the donor pool (grey). Effect sizes are weighted by pre-treatment RMSPE.

Results: % tech firms

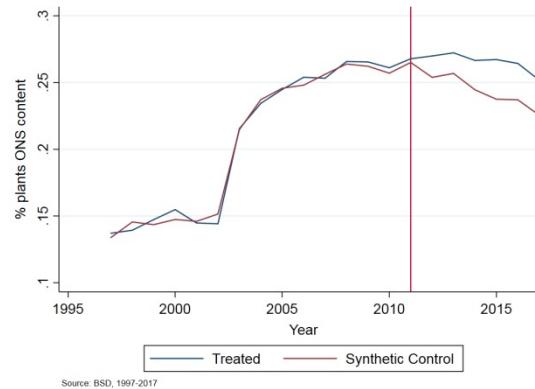
% digitech firms



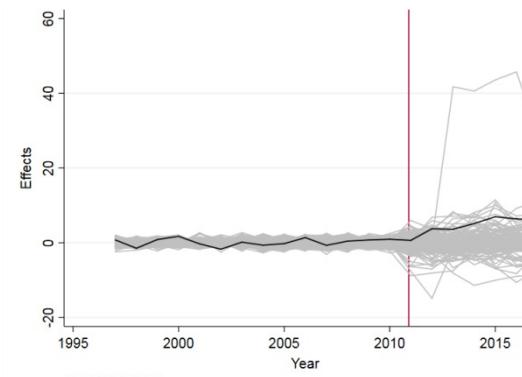
Placebo test, % digitech firms



% content firms



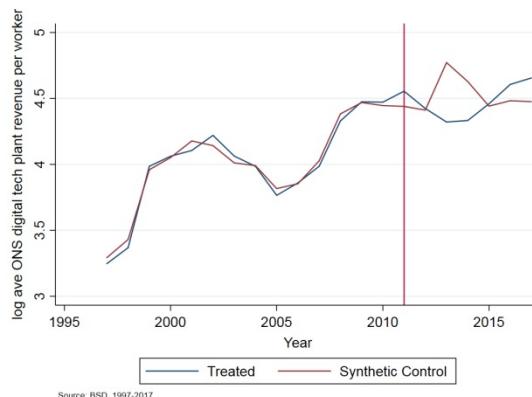
Placebo test, % content firms



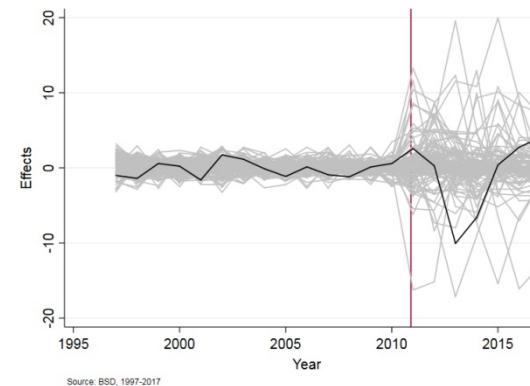
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Results: tech firm revenue/worker

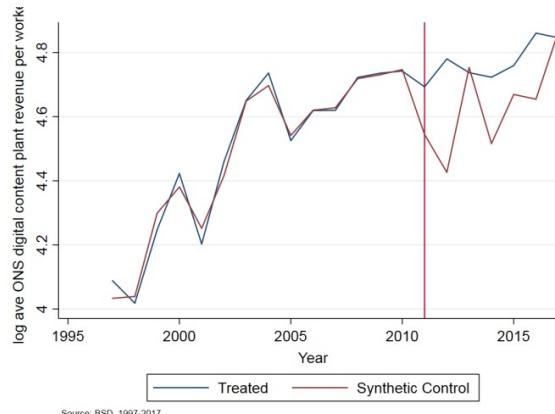
Log digitech firm performance



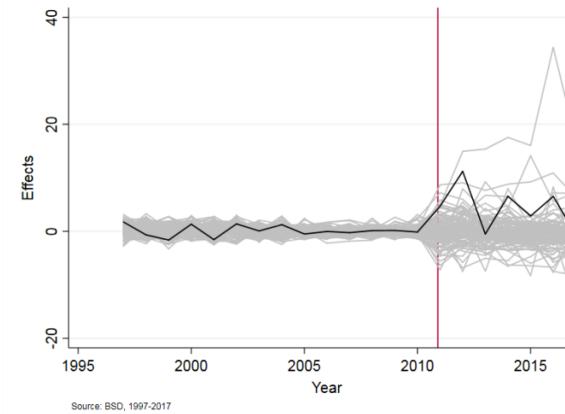
Placebo test, log digitech



Log content firm performance



Placebo test, log content



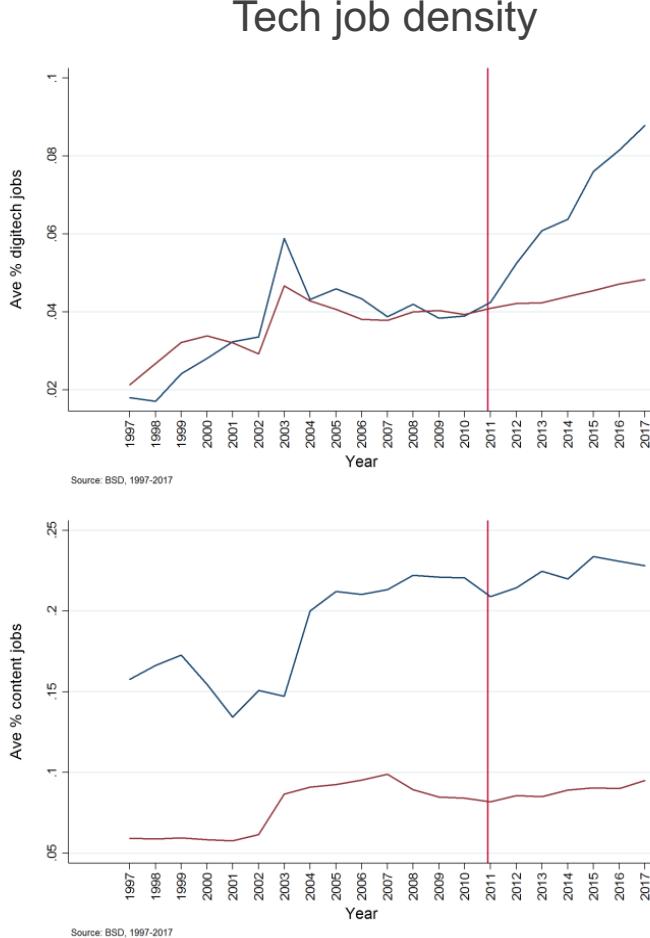
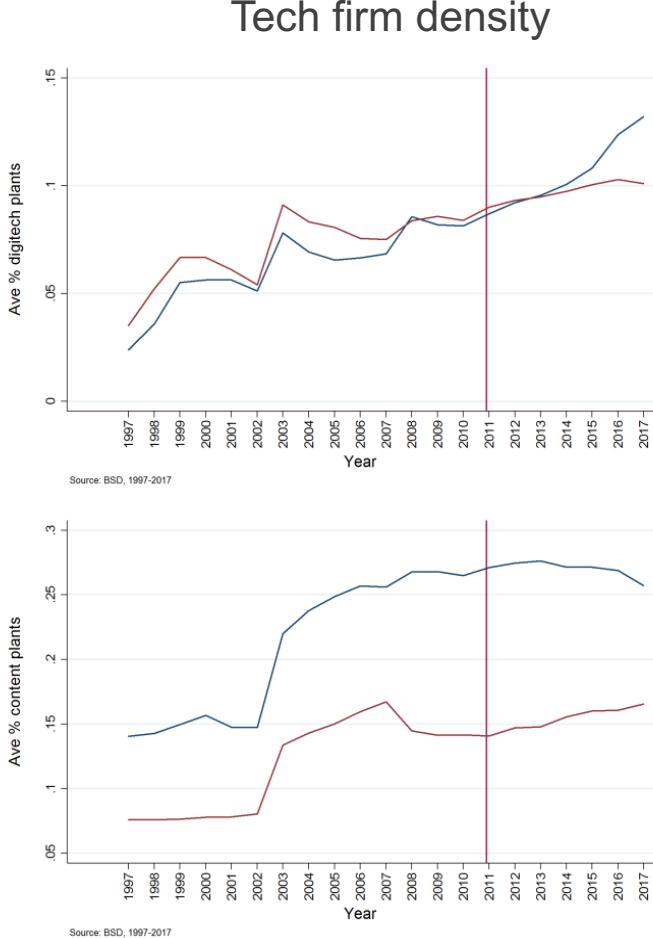
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Extensions

- **Timing:** outcomes start changing *before* policy starts. What does the policy add? In 7/10 cases, effect sizes/year are *smaller* after policy starts. Implies little added value [[detail](#)]
- **Dispersion channel:** big rises in digital tech activity in inner ring (<250m from roundabout); digital content plants and jobs move to outermost ring (750-1000m) [[detail](#)]. In and out-movers mainly within rest of London
- **Competition channel:** cluster growth driven by new entry; falling share of leavers; little role of foreign-owned firms [[detail](#)]. No policy effect on high-growth firm activity [[detail](#)]

The cluster is unlike the rest of London

% digital content
firms / all firms



— TC zone LSOAs — Rest of London LSOAs

TC vs rest of London: pre-treatment

Variable	TC lsoa	ROGL lsoa
ONS digital tech plant count	15.854	4.297
ONS content plant count	57.503	9.620
ONS digitech & content plant count	72.406	13.616
GI tech plant count	103.826	26.952
% plants ONS digital tech	0.063	0.071
% plants ONS digital content	0.208	0.118
% plants ONS digital tech & content	0.267	0.184
% plants GI tech	0.359	0.361
LSOA total employment	4199.506	796.347
ONS digital tech employment	172.100	21.944
ONS content plant employment	928.866	76.554
ONS digitech & content plant employment	1070.226	96.179
GI tech plant employment	1941.463	291.417
% employment ONS digital tech	0.036	0.036
% employment ONS digital content	0.185	0.077
% employment ONS digital tech & content	0.218	0.109
% employment GI tech	0.357	0.329
LSOA total revenue per worker	1.35e+05	17763.513
Total ONS digital tech revenue	1816.104	429.743
Total ONS content plant revenue	8931.765	1440.213
Total ONS digitech & content plant revenue	10654.802	1838.854
GI tech plant revenue	1.01e+05	8019.650
LSOA mean plant revenue per worker	274.280	110.875
mean ONS digital tech revenue per worker	86.051	83.444
mean ONS content revenue per worker	145.584	101.966
mean ONS digitech & content revenue per worker	142.313	92.411
Mean GI tech revenue per worker	409.367	104.468
<i>Observations</i>	350	67144

Source: BSD.

TC vs rest of London: pre-treatment (2)

Variable	TC lsoa	ROGL lsoa
Herfindahl Index	0.148	0.150
LSOA total cafes and restaurants	7.734	2.511
LSOA total bars pubs and clubs	3.340	0.989
LSOA total coworking spaces	1.740	0.646
LSOA total galleries and museums	0.180	0.048
LSOA total libraries	0.323	0.085
LSOA total hotels	0.000	0.000
LSOA total other accommodation	0.080	0.057
LSOA total arts and arts support activities	11.349	2.573
LSOA total supporting arts orgs	0.271	0.068
LSOA total HEIs	0.557	0.143
LSOA count of TFL stations	0.120	0.098
LA share of non-UK born	0.310	0.256
LA share of residents aged 18-29	0.231	0.197
<i>Observations</i>	350	67144

Source: BSD.

Data + build

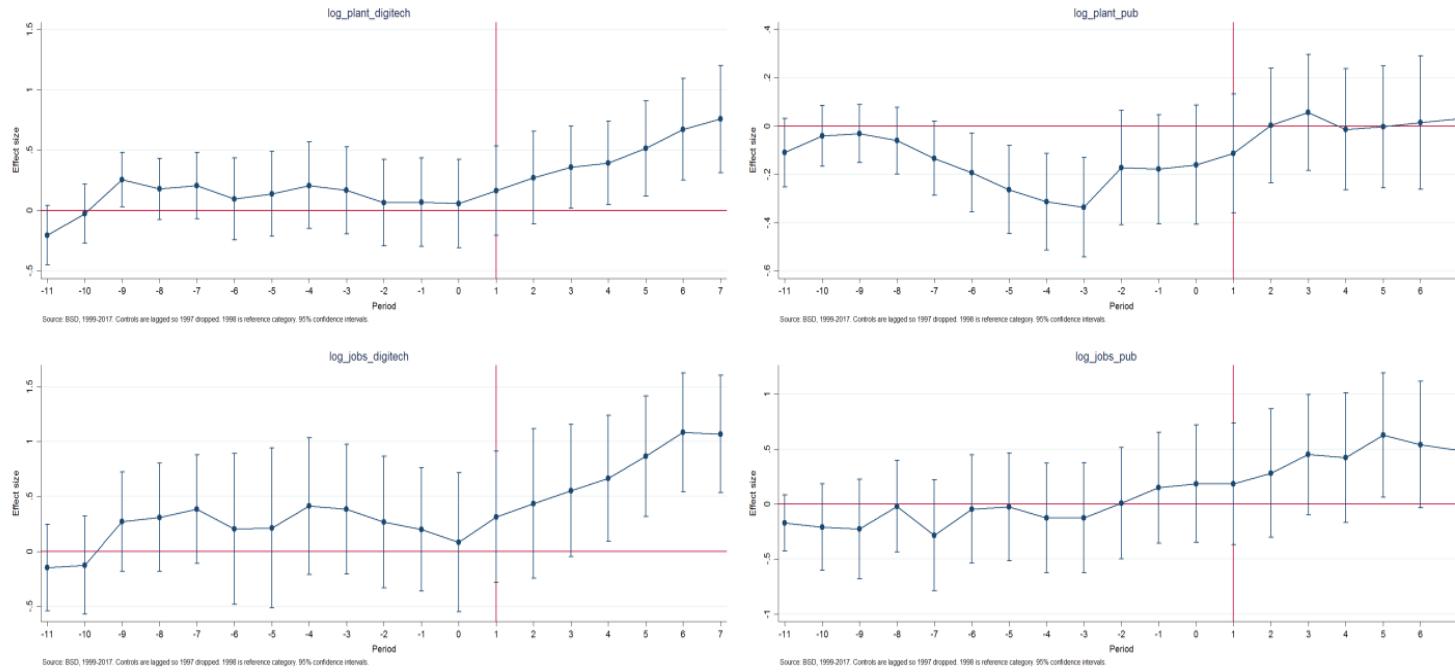
- **BSD plant level data, financial years 1997-2017:** covers over 99% of UK firms, geocoded to postcodes
- Plus Census, ONS demographics, TFL data for controls
- Build an LSOA panel: 101,503 area*year obs, for 4,835 LSOAs in Greater London:
 - Define cluster using 250m rings from Old St roundabout
 - 1km zone = 25 treated LSOAs
 - Controls taken from 1km exclusion zone around the cluster
 - Tech City policy happens in BSD year 2011
 - Outcomes: LSOA net counts + shares of tech firms, jobs; LSOA average tech revenue/worker
 - Look at digital content *and* digital tech (ONS 2015)

Matched sample: PSM

Variable	Means, 1997-2010		T-test		V_e(T)/ V_e(C)	
	Treated	Control	%bias	t	p>t	
# plant entry ONS digitech & content	1.669	0.571	35.7	10.26	0	4.26*
Mean revenue ONS digitech & content	1441	1440	0	0	0.997	0.19*
Mean revenue/worker ONS digitech & content	136	138	-0.7	-0.09	0.925	0.17*
% plants ONS digital tech and content	0.302	0.264	33.5	6.98	0	0.84*
% employment ONS digital tech and content	0.240	0.196	29.1	5.95	0	0.92
Herfindahl Index	0.158	0.155	5.1	0.91	0.365	0.37*
% cafes and restaurants	0.028	0.027	4.3	0.93	0.351	0.73*
% bars cafes and clubs	0.015	0.015	-2.5	-0.46	0.645	0.58*
% coworking and shared offices	0.008	0.008	-3.8	-0.87	0.384	0.88
% galleries and museums	0.002	0.001	7.1	1.11	0.269	0.46*
% libraries	0.001	0.001	-2.9	-0.49	0.621	0.17*
% other accommodation	0.000	0.001	-3.7	-0.79	0.431	0.37*
% artists and performers	0.040	0.045	-13.6	-2.47	0.014	0.33*
% arts facilities and supp	0.001	0.001	5.7	1.45	0.146	1
% universities and colleges	0.002	0.002	5.3	1.14	0.255	0.33*
Count of TFL stations	0.120	0.103	5	1.02	0.306	0.76*
LA share of non-UK born	0.332	0.348	-23.9	-4.32	0	0.33*
LA share of residents aged 18-29	0.232	0.240	-25.5	-5.67	0	1.13
<i>Observations</i>	350	2982	n/a	n/a	n/a	n/a
<i>Summary stats</i>	MeanBias	MedBias	B	R		
	11.5	5.2	71.5*	1.26		

Source: BSD 1997-2010, 1991/2001/2011 Census, ONS mid-year population estimates, TFL. Probit regression using nearest neighbour matching (nn = 1) where dependent variable = LSOA is in the Tech City Zone. Results shown for 25 Tech City LSOAs and 213 matched control LSOAs with the 25% highest propensity scores of all controls. Variance ratio should equal 1 if matched group is perfectly balanced with treatment group. * = variance ratio is 'of concern', i.e. variance ratio in [0.84, 1.19). B and R indicate Rubin's B and R ratios. For samples to be sufficiently balanced, B < 25 and 0.25 < R < 2. * = values outside these ranges.

Matched sample: example balancing regressions



Source: BSD, Census, ONS mid-year population estimates, TFL. 95% confidence intervals. 1998 is reference category, 1997 dropped via lags. All regressions fit LSOA and year dummies. Time-varying controls fitted are one-year lags of LSOA all-sector plant entry, LSOA all-sector revenue/worker, LSOA Herfindahl Index, a vector of amenities (LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, accommodation, arts and arts support, venues, universities), TFL station count, LA share of migrants, LA share of under-30s. Standard errors clustered on LSOA.

Variable	Tech City	Synthetic Tech City	Matched sample
Log content plants (1997)	2.613	2.609	1.626
Log content plants (1998)	2.722	2.721	1.645
Log content plants (1999)	2.757	2.775	1.665
Log content plants (2000)	2.781	2.758	1.698
Log content plants (2001)	2.773	2.810	1.747
Log content plants (2002)	2.805	2.778	1.754
Log content plants (2003)	3.234	3.256	2.260
Log content plants (2004)	3.311	3.334	2.335
Log content plants (2005)	3.323	3.347	2.414
Log content plants (2006)	3.356	3.344	2.485
Log content plants (2007)	3.431	3.417	2.563
Log content plants (2008)	3.495	3.448	2.448
Log content plants (2009)	3.500	3.488	2.454
Log content plants (2010)	3.468	3.457	2.413
Plant entry, all sectors	3.260	3.182	1.793
Revenue / worker, sectors	258.774	255.350	134.660
Herfindahl Index	0.136	0.136	0.146
LSOA plants, all sectors	238.760	228.364	127.748
LSOA jobs, all sectors	3836.394	3789.643	1467.235
LSOA total cafes and restaurants	7.074	7.135	4.045
LSOA total bars pubs and clubs	3.074	2.965	1.545
LSOA total coworking spaces	1.523	1.958	1.658
LSOA total musuems and galleries	0.169	0.165	0.156
LSOA total libraries	0.311	0.303	0.084
LSOA total other accommodation	0.063	0.062	0.065
LSOA total arts and arts support activities	10.669	10.900	5.596
LSOA total supporting arts orgs	0.249	0.314	0.153
LSOA total HEIs	0.506	0.507	0.255
LSOA count of TFL stations	0.111	0.126	0.098
LA population	187283.078	188577.406	2.36e+05
LA share of non-UK born	0.309	0.311	0.348
LA share of residents aged 18-29	0.229	0.230	0.241
<i>Observations</i>	350	2982	2982

Results: cluster size

A. Cluster size	Plants		Jobs	
	Digitech	Content	Digitech	Content
Synthetic control ATT	0.270***	0.079**	0.440***	0.123*
p-value	0.005	0.023	0.005	0.061
Pre-treatment RMSPE	0.024	0.023	0.028	0.035
Average pre-treatment quality	1	1	1	1
<i>Diff-in-diff ATT</i>	0.28*** -0.104	0.06 -0.068	0.42*** -0.131	0.13 -0.115
<i>Observations</i>	4500	4646	4494	4639
<i>R</i> ²	0.8	0.91	0.8	0.87
Pre-treatment mean	15.954	56.551	172.891	898.126

Source: BSD / Census / ONS / TfL. Synthetic control panel shows *p*-values from permutation test on 2013 placebos , pre-treatment error rate and proportion of placebos with pre-treatment error rate \geq average of the treated unit. Regressions fit lagged outcome predictors 1997-2010 plus 1-year lags of LSOA all-sector plant entry, LSOA all-sector revenue/worker, LSOA Herfindahl Index, a vector of amenities (LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, other accommodation, arts and arts support, venues, universities), TfL station count, LA share of migrants, LA share of under-30s. Weights optimised defining \mathbf{V} as an identity matrix. DID regressions fit LSOA and year dummies plus controls as above. Standard errors clustered on LSOA. * significant at 10%, ** 5%, *** 1%.

Results: cluster density

B. Cluster density	% plants		% jobs	
	Digitech	Content	Digitech	Content
Synthetic control ATT	0.013***	0.02*	0.031***	0.049***
<i>p</i> -value	0.005	0.084	0.009	0.009
Pre-treatment RMSPE	0.001	0.004	0.002	0.003
Average pre-treatment quality	1	1	1	1
<i>Diff-in-diff</i> ATT	0.01*	0	0.02**	0.02
	-0.007	-0.009	-0.008	-0.017
<i>Observations</i>	4760	4760	4760	4760
<i>R</i> ²	0.58	0.7	0.47	0.6
Pre-treatment mean	0.063	0.204	0.036	0.182

Source: BSD / Census / ONS / TfL. Synthetic control panel shows *p*-values from permutation test on 2013 placebos , pre-treatment error rate and proportion of placebos with pre-treatment error rate \geq average of the treated unit. Regressions fit lagged outcome predictors 1997-2010 plus 1-year lags of LSOA all-sector plant entry, LSOA all-sector revenue/worker, LSOA Herfindahl Index, a vector of amenities (LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, other accommodation, arts and arts support, venues, universities), TfL station count, LA share of migrants, LA share of under-30s. Weights optimised defining \mathbf{V} as an identity matrix. DID regressions fit LSOA and year dummies plus controls as above. Standard errors clustered on LSOA. * significant at 10%, ** 5%, *** 1%.

Results: firm ‘productivity’

C. Cluster firm performance	Revenue / worker	
	Digitech	Content
Sythetic control ATT	-0.043*	0.139**
<i>p</i> -value	0.07	0.042
Pre-treatment RMSPE	0.045	0.032
Average pre-treatment quality	0.986	0.986
<i>Diff-in-diff</i> ATT	-0.02	0.03
	-0.062	-0.092
<i>Observations</i>	4489	4637
<i>R</i> ²	0.35	0.48
Pre-treatment mean	86.119	146.662

Source: BSD / Census / ONS / TfL. Synthetic control panel shows *p*-values from permutation test on 2013 placebos , pre-treatment error rate and proportion of placebos with pre-treatment error rate \geq average of the treated unit. Regressions fit lagged outcome predictors 1997-2010 plus 1-year lags of LSOA all-sector plant entry, LSOA all-sector revenue/worker, LSOA Herfindahl Index, a vector of amenities (LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, other accommodation, arts and arts support, venues, universities), TfL station count, LA share of migrants, LA share of under-30s. Weights optimised defining \mathbf{V} as an identity matrix. DID regressions fit LSOA and year dummies plus controls as above. Standard errors clustered on LSOA. * significant at 10%, ** 5%, *** 1%.

Timing / falsification

Specification	Plants		Jobs		% plants		% jobs		Ave rev/worker	
	Digitech	Content	Digitech	Content	Digitech	Content	Digitech	Content	Digitech	Content
A. Main synthetic control ATT	0.270*** <i>p-value</i> 0.005 RMSPE 0.024	0.079** 0.023 0.023	0.440*** 0.005 0.028	0.123* 0.061 0.035	0.013*** 0.005 0.001	0.02* 0.084 0.004	0.031*** 0.009 0.002	0.049*** 0.009 0.003	-0.043* 0.07 0.045	0.139** 0.042 0.032
B. Start treatment in 2008	0.451** <i>p-value</i> 0.014 RMSPE 0.028	0.248** 0.014 0.032	0.495*** 0.005 0.038	0.168 0.248 0.054	0.018*** 0.005 0.001	0.038** 0.023 0.003	0.007* 0.051 0.002	0.064** 0.033 0.005	0.382** 0.023 0.038	0.048 0.327 0.047
C. Start treatment in 2008, end in 2010	0.347** <i>p-value</i> 0.019 RMSPE 0.028	0.188** 0.037 0.032	0.284** 0.014 0.038	0.183 0.229 0.054	0.015*** 0.005 0.001	0.034** 0.019 0.003	-0.013* 0.07 0.002	0.023* 0.065 0.005	0.679*** 0.009 0.038	-0.017 0.902 0.047
D. End treatment in 2014	0.142** <i>p-value</i> 0.042 RMSPE 0.024	0.011 0.238 0.023	0.422*** 0.005 0.028	0.076 0.112 0.035	0.008*** 0.005 0.001	0.014 0.168 0.004	0.022** 0.014 0.002	0.043** 0.019 0.003	-0.155** 0.047 0.045	0.173** 0.028 0.032
Effect size / year, 2011-2017	0.039	0.011	0.063	0.018	0.002	0.003	0.004	0.007	-0.006	0.020
Effect size / year, 2008-10	0.116	0.063	0.095	0.061	0.005	0.011	-0.004	0.008	0.226	-0.006
Effect size / year, 2011-2014	0.036	0.003	0.105	0.019	0.002	0.004	0.005	0.011	-0.039	0.043

Source: BSD / Census / ONS / TfL. Notes as in previous tables.

Treatment intensity estimator

- For LSOA i , year t , I estimate:

$$Y_{it} = D250_i + D500_i + D750_i + D1000_i + T_t + \\ a1TC250_{it} + a2TC500_{it} + a3TC750_{it} + \\ a4TC1000_{it} + \mathbf{CTRLS}b_{it} + e_{it} \quad (4)$$

- Y and **CTRLS** are specified as before.
- $D250$ - $D1000$ are dummies taking the value 1 for LSOAs in distance rings 250-1000m from Old St roundabout.
- Coefficients of interest are $a1$ - $a4$, which give the *relative effect* of treatment post-2011 in an LSOA *in that distance ring*, versus control LSOAs.

Treatment intensity

	Plants		Jobs		% plants		% jobs	
	Digitech	Content	Digitech	Content	Digitech	Content	Digitech	Content
<i>Diff in diff ATT</i>	0.28*** (0.104)	0.06 (0.068)	0.42*** (0.131)	0.13 (0.115)	0.01* (0.007)	0.00 (0.009)	0.02** (0.008)	0.02 (0.017)
Roundabout + 250m	1.03*** (0.063)	0.68*** (0.119)	0.76*** (0.189)	0.12 (0.188)	0.03*** (0.011)	-0.05*** (0.013)	0.00 (0.012)	-0.04 (0.026)
Roundabout + 500m	-0.06 (0.258)	-0.11 (0.126)	-0.06 (0.316)	0.03 (0.223)	0.01 (0.017)	0.01 (0.015)	-0.01 (0.021)	-0.06 (0.046)
Roundabout + 750m	0.16 (0.286)	-0.10 (0.104)	0.01 (0.304)	-0.49** (0.187)	0.01 (0.016)	-0.04** (0.016)	0.02 (0.019)	0.02 (0.044)
Roundabout + 1000m	0.18 (0.143)	0.12 (0.094)	0.40** (0.175)	0.37** (0.147)	0.00 (0.009)	0.02* (0.013)	0.01 (0.008)	0.03 (0.021)
Observations	4500	4646	4494	4639	4760	4760	4760	4760
R ²	0.80	0.91	0.80	0.87	0.58	0.70	0.47	0.60
Area controls	Y	Y	Y	Y	Y	Y	Y	Y
Pre-treatment controls	Y	Y	Y	Y	Y	Y	Y	Y

Source: BSD / Census / ONS / TfL. Difference in difference analysis on matched sample. Distance ring coefficients give the relative effect of treatment on neighbourhoods in that distance ring, relative to control LSOAs outside the cluster. Controls are 1-year lags of LSOA all-sector plant entry, plant counts and job counts, LSOA all-sector revenue/worker, LSOA Herfindahl Index, LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, hotels and other accommodation, arts and arts support, venues, universities, count of tube and rail stations, LA population, LA share of migrants, LA share of under-30s, plus LSOA and year dummies. Standard errors clustered on LSOA. * significant at 10%, ** 5%, *** 1%.

Churn

A. All tech plants	2009-2010		2013-2014		2016-2017	
	count	%	count	%	count	%
In the UK	460,926		498,082		595,583	
In Tech City Zone	3,469		3,985		6,323	
Stayers	2,208	63.7	2,277	57.1	3,516	55.6
Entrants	635	18.3	988	24.8	2,082	32.9
Leavers	626	18.0	720	18.1	718	11.4
<i>Entrants</i>						
<i>Movers from rest of London</i>	173	27.2	187	18.9	488	23.4
<i>Movers from rest of UK</i>	37	5.8	67	6.8	130	6.2
<i>New plant</i>	425	67	734	74.3	1,471	70.4
<i>Leavers</i>						
<i>Moved to rest of London</i>	158	25.2	222	30.8	310	43.2
<i>Moved to rest of UK</i>	45	7.2	35	4.9	79	11
<i>Died</i>	423	67.6	463	64.3	329	45.8

Source: BSD

Scaling

	# High-growth episodes: revenue/worker		# High-growth episodes: jobs	
	digitech	content	digitech	content
Synthetic control ATT	1.082	0.503	0.261	0.279
<i>p</i> -value	0.103	0.178	0.276	0.150
Number of placebos	213	213	213	213
Pre-treatment RMSPE	0.184	0.700	0.072	0.123
Average pre-treatment quality	0.793	0.502	0.183	0.437
<i>Pre-treatment mean</i>	<i>36.143</i>	<i>127.214</i>	<i>9.00</i>	<i>24.71</i>

Source: BSD / Census / ONS / TfL. Synthetic control panel shows *p*-values from permutation test, number of placebos used, pre-treatment error rate and proportion of placebos with pre-treatment error rate \geq average of the treated unit. Regressions fit lagged outcome predictors 1997-2010 plus 1-year lags of LSOA all-sector plant entry, LSOA all-sector revenue/worker, LSOA Herfindahl Index, a vector of amenities (LSOA counts of cafes and restaurants, bars/pubs/clubs, co-working spaces, galleries and museums, libraries, other accommodation, arts and arts support, venues, universities), TfL station count, LA share of migrants, LA share of under-30s. Weights optimised defining \mathbf{V} as an identity matrix. DID regressions fit LSOA and year dummies plus controls as above. Standard errors clustered on LSOA. * significant at 10%, ** 5%, *** 1%.

Policy limits, policy ideal-types

- Better policy would start from acknowledging limits!
 - Clarity on objectives
 - Accept + design policy to mitigate tradeoffs
 - Lens: Industrial policy > branding
 - Basically an experimental setting
 - Use evidence based approaches
 - Policy as process (Rodrik, 2004)
- What might all that achieve? Ultimately, it depends on your expectations for public policy in general
 - World is knowable and improvable: policy as incremental mitigation / gains (Lindblom, 1959)
 - World is chaotic; policy is series of temporary fixes (Harvey 1989, Jessop 2012, 2016)