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Commuting Fast and Slow: the Effects of High Speed Rail

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Results are preliminary, subject to change and not to be cited or quoted

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This project

Assessing the effects of reductions in commuting times from HS1

- Analyse introduction of HS1 commuter services in South East of England in 2010
- Descriptive evidence on household location choices and business performance
- Implications for ‘who gains’ and ‘who loses’

- To do this we combine:
  - Spatial data on changes in commuting times into the City of London
  - Data on housing transactions
  - Census data on demographics
  - Plant-level data on employment, entry, exit, sales, labour productivity and wages

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What we find

- Decreases in travel times to London are associated with
  - Household responses
    - Increases in population
    - Increases in house prices
    - Changes in employment and occupational composition of residents

- Shorter travel times to London are associated with
  - Measures of stronger firm performance
    - Labour productivity, value-added, employment and average wage
    - Driven in part by sorting?

- Implications for policies which move a relatively peripheral area “closer” to a major agglomeration?

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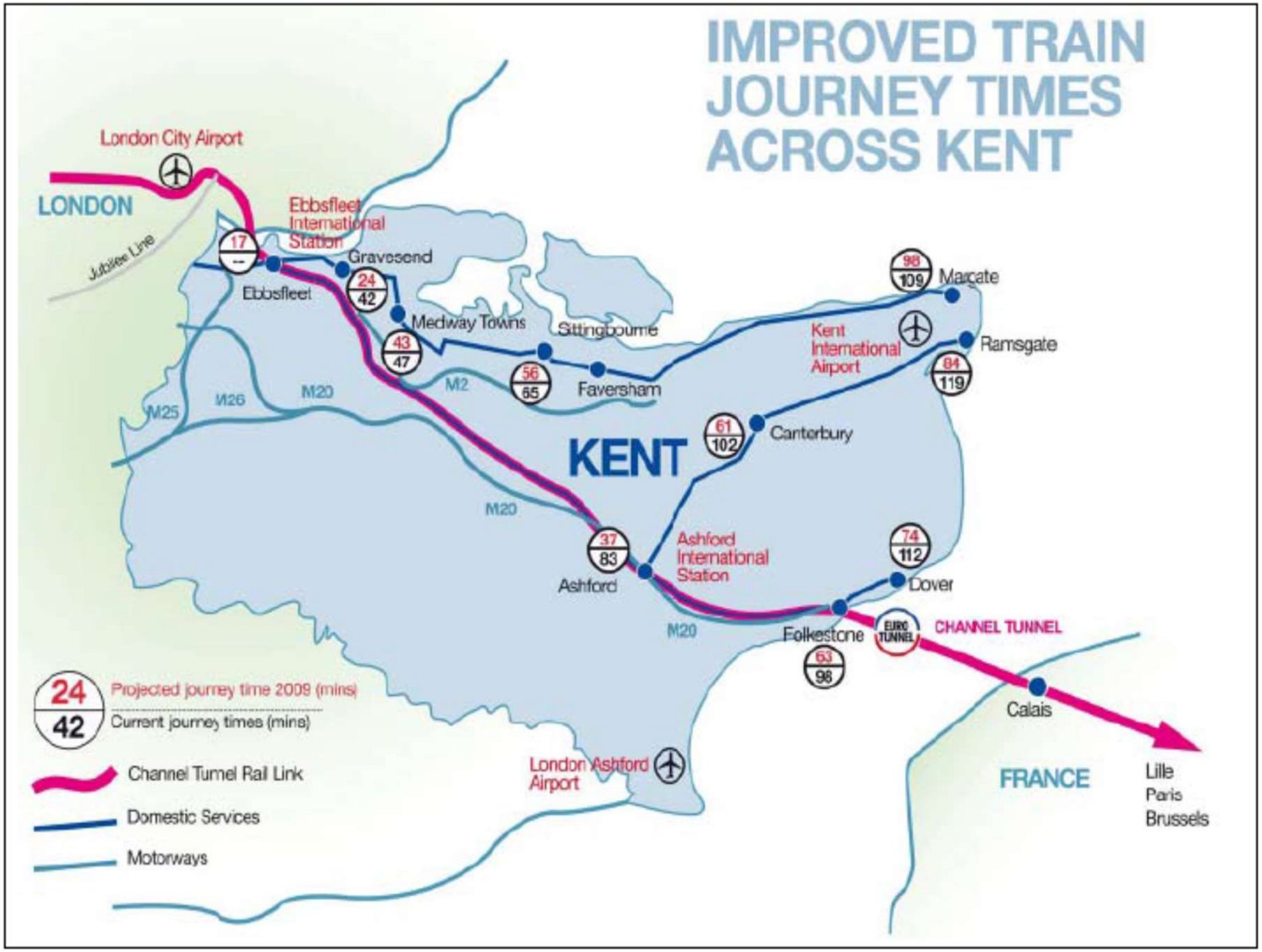
2010 domestic High-Speed service from East Kent to St Pancras



Source: Colin Buchanan (2009)

Potential effects of reductions in commuting time

- HS1 reduces commuting time from locations in Kent into Central London
  - 1hr reduction in commuting time priced at roughly the minimum wage

- Widening of geographic labour market
- And of market for amenities, consumer spending, and firm inputs

- **Household location decisions**
  - Increased population in affected areas
    - Vary according to demand for commuter transport by different groups
  - Increased demand for housing
  - Depending on changes in housing supply – increased land prices

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Potential effects of reductions in commuting time

- **Local businesses**
  - Agglomeration benefits and market access
  - Increased competition from London?
    - Changes in demand (increase in consumers, but substitution to purchasing in London)
    - Asymmetric effects on different sectors depending on how 'local' demand is
  - Input prices
    - Changes in labour supply (population increase, but substitution to London?)
    - Increases in land prices
  - Exit of least productive businesses?
  - Productivity growth among survivors?

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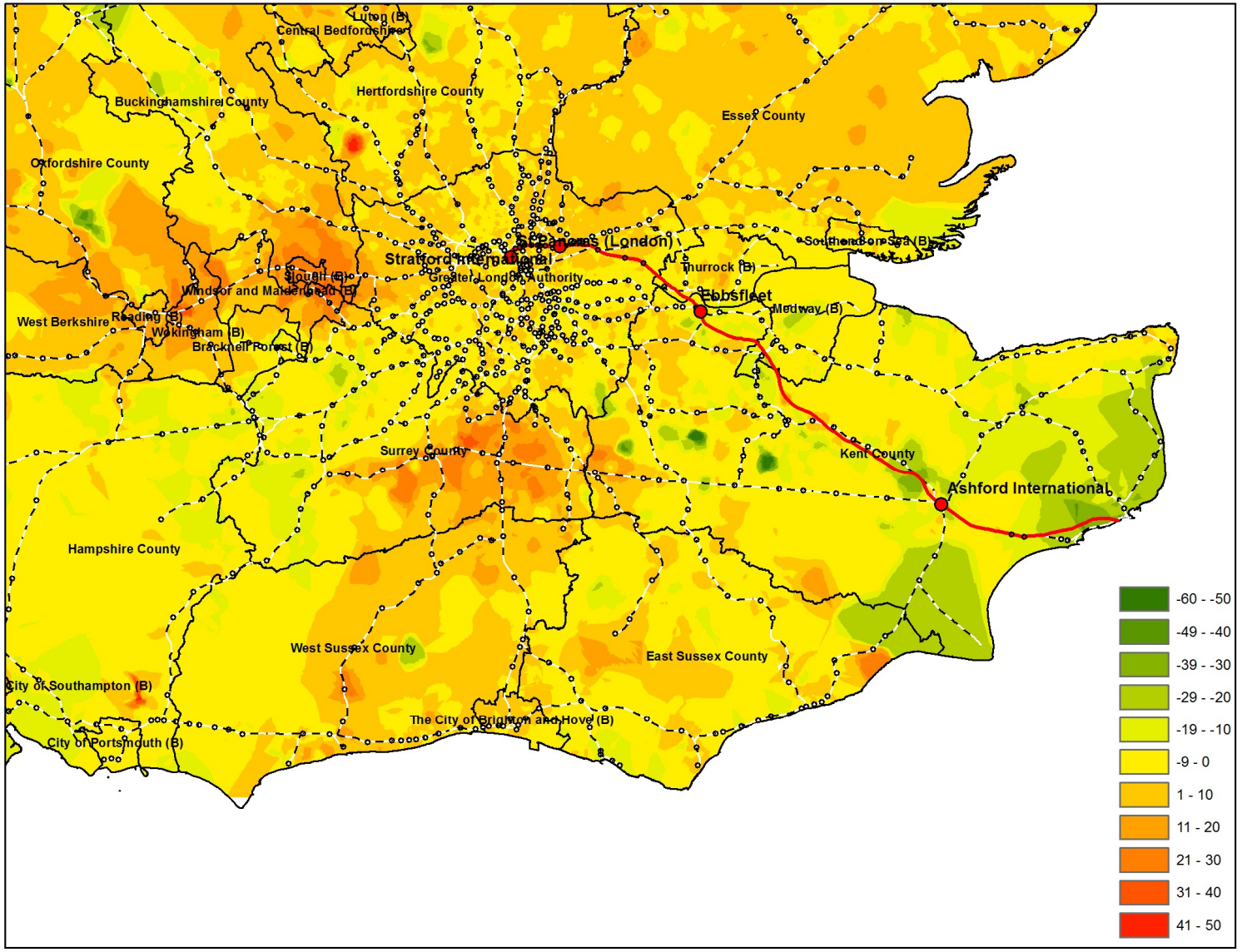
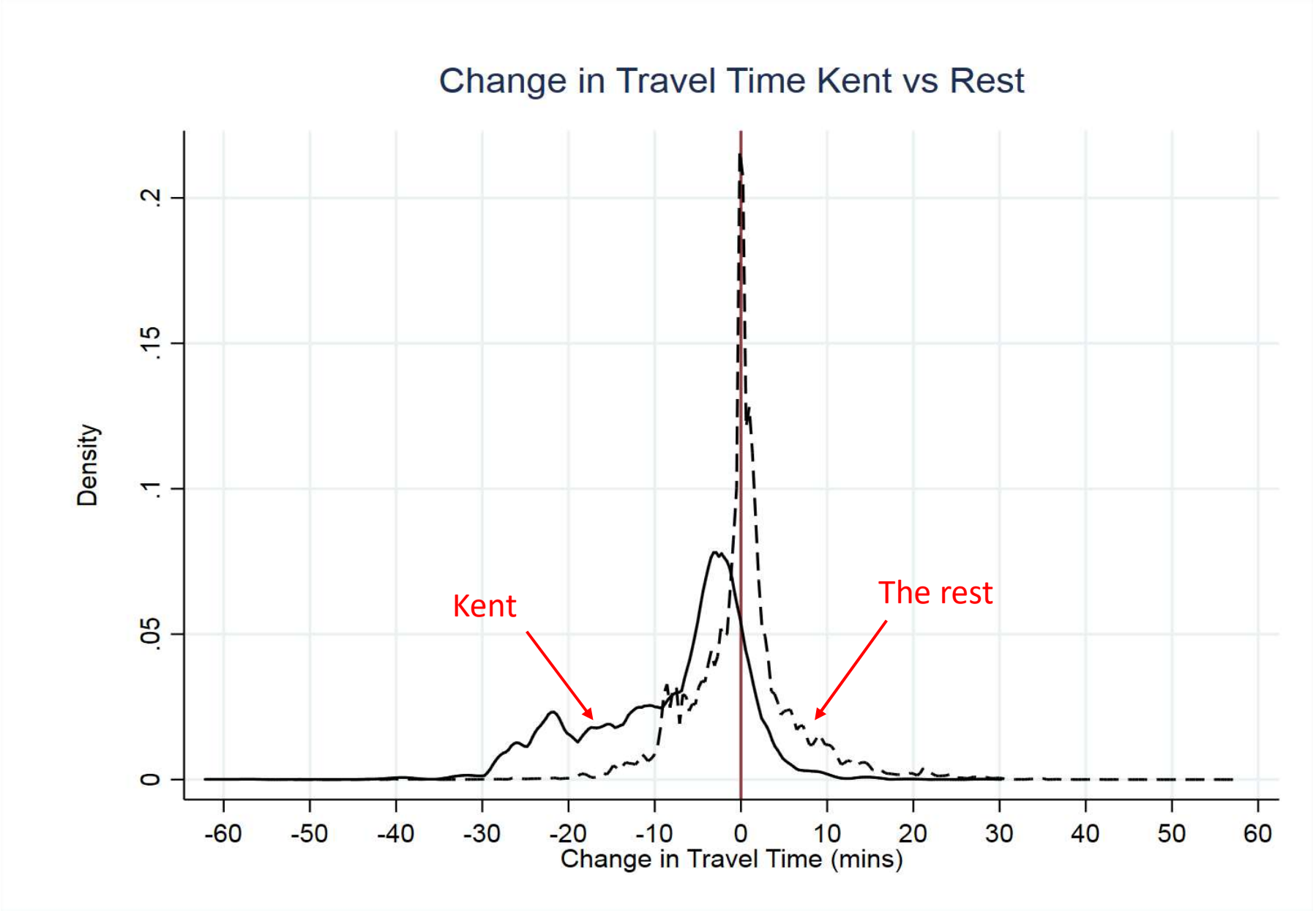
Travel time data: changes in rush-hour commuting time to Bank tube station before to after 2010



Changes in commuting time



General empirical approach

- Estimate the relationship between outcome variable *y* and commuting time

$$y_{rt} = \alpha + \beta_1 Commute_{rt} + r_r + \sum_j \gamma_j \left(H_j \times post\right) + \epsilon_{rt}$$

Vary level of geographic aggregation *r* across the different outcome variables

y_{rt} : e.g. $\ln(p_{rt})$: log of average house price in postcode *r* in year *t*

$Commute_{rt}$: travel time to London from postcode *r* in year *t* (in 10s of minutes)

r_r : postcode fixed effects

$H_j \times post$: geographic proximity to London (10km bands), pre/post HS1 fixed effects

- Estimate on sample for Kent and expand to cover a commuter ring around London
  - But might HS1 affect this potential 'control group'?

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Results: house prices

	Kent	**Full commuter zone**
Kent Commute_{rt}	-0.016*	-0.016*
	(0.009)	*(0.009)*
Outside Kent Commute_{rt}		-0.004
		(0.003)
House controls	Yes	Yes
Postcode f.e.s	Yes	Yes
H_j*post f.e.s	Yes	No
County*H_j*post f.e.s	No	Yes
Obs.	14,746	119,308
R^2	0.93	0.95

10 minute reduction in commute associated with a 1.6% increase in house prices

Summary of house price and household results

- For estimation sample, average change in travel time in Kent -10%, for other areas -0.5%
- For areas in Kent with an initial commute of 90mins+, a 10% reduction in travel time (~14mins) associated with approximately:
  - 2-4% higher house prices
  - 0.3ppt (~11% of 2011 mean) higher share of individuals using train to commute
  - Working-age population 6% higher
  - 0.7ppt (~3%) lower share of population with no qualifications
  - No (short-term) effect on unemployment in Kent on average
  - Increases in share of employees in wholesale and retail, business services and hotels and restaurants industries
- Implications for (local) demand and labour supply?

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Data: business performance

- UK Business Structure Database (BSD): plant-level data 2005-2015
  - Population of plants
  - Employment, entry and exit
  - Location, industry
  - Ownership type (private, public and not-for-profit) & structure

- UK Annual Business Survey / BRES: establishment-level data 2005-2014
  - Stratified sample of establishments
  - Sales, value-added, employment, average wage
  - Location of single-plant establishments, industry

- Use both at plant level and aggregated to postcode district level
- Analyse a band 20km-180km from London
- Additionally control for industry and ownership type fixed effects

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Results from the BSD: employment, entry and exit

- Across all industries, lower commuting times associated with
  - Higher employment and lower plant entry

- By industry
  - Wholesale and retail and business services see lower entry and higher exit

As commuting time to London declines….

	Entry rate increases	**Entry rate decreases**
Exit rate increases	Construction	Wholesale and retail Business services
Exit rate decreases		Education Health

  - Change in the location of demand for some industries?
  - Increases in commercial rents and/or competition from London leading to exit of less productive plants?
  - Implications of competition and sorting for productivity

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Results on plant performance

- Whole sample area-level and plant-level analysis
  - Lower commuting times associated with
    - Higher value-added, labour productivity and wages
    - But difficult to identify from variation over time in commuting duration alone

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Results: plant-performance, area-level

	Log(VA)	Log(VA)	Log(LP)	Log(LP)	Log(mean wage)	Log(mean wage)
Kent Commute_{rt}	-0.033** *(0.015)*		-0.026** *(0.008)*		-0.034*** *0.008*	
Outside Kent Commute_{rt}	-0.024* *(0.014)*		-0.014* *(0.008)*		-0.021** *(0.007)*	
Postcode district f.e.s	No		No		No	
Obs.	5,568		5,607		5,560	
R^2	0.20		0.06		0.07	

Note: Data are aggregated to the postcode district, 2-digit industry, year level. Table shows coefficients and standard errors. All regressions contain the following fixed effects: industry, year, County*H_j*post2010, plus a measure of the fraction of plants that are part of foreign MNEs.
Source: authors' calculations using ABS/BRES and travel time data

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Results: plant-performance, area-level

	Log(VA)	Log(VA)	Log(LP)	Log(LP)	Log(mean wage)	Log(mean wage)
Kent Commute_{rt}	-0.033** *(0.015)*	-0.022 *(0.035)*	-0.026** *(0.008)*	0.017 *(0.044)*	-0.034*** *0.008*	0.011 *(0.031)*
Outside Kent Commute_{rt}	-0.024* *(0.014)*	-0.003 *(0.026)*	-0.014* *(0.008)*	0.007 *(0.021)*	-0.021** *(0.007)*	0.022 *(0.021)*
Postcode district f.e.s	No	Yes	No	Yes	No	Yes
Obs.	5,568	5,568	5,607	5,607	5,560	5,560
R^2	0.20	0.53	0.06	0.21	0.07	0.23

Note: Data are aggregated to the postcode district, 2-digit industry, year level. Table shows coefficients and standard errors. All regressions contain the following fixed effects: industry, year, County*H_j*post2010, plus a measure of the fraction of plants that are part of foreign MNEs.
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Results on plant performance

- Whole sample area-level and plant-level analysis
  - Lower commuting times associated with
    - Higher value-added, labour productivity and wages
    - But difficult to identify from variation over time in commuting duration alone

- By industry
  - Some evidence of performance improvements in wholesale and retail and in business services within-areas as commuting time declines

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Business performance: preliminary findings

- Business performance (employment, value-added and labour productivity) increasing in time-proximity to London
- But difficult to identify from within-plant or within-area changes
- Potential evidence that this relationship in part driven by sorting
  - Less entry and more exit of plants in some sectors

- Ten minute lower travel time to London associated with
  - 3-4% higher plant employment
  - 3-5% higher sales and value-added
  - 1.5-2.5% higher labour productivity

- Sectors where sorting and performance improvements most in evidence:
  - Wholesale and retail
  - Business services

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Conclusions

- Evidence of spatial re-allocation of households in response to lower commuting times

- Potential distributional impact of (major) transport projects driven by compositional changes
- Benefits accruing to landowners
- Lower income households priced out?

- Changes in the composition of employment among residents

- Evidence that conditional on geographic distance, shorter travel times to London associated with stronger business performance
- Sorting and competition? Only more productive firms locate in these areas

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