READ ME

This file provides further information on the Stata and Matlab code to replicate all the results in the paper and online appendix for "Making of the Modern Metropolis: Evidence from London" (Stephan Heblich, Stephen Redding and Daniel Sturm).

First, we list the tables and figures in the paper and summarize the corresponding file in the replication code that generates these results. Second, we explain the order in which the Stata and Matlab code must be run in order to replicate all the results in the paper.

SJR, April 2020

SUMMARY OF WHICH FILES GENERATE WHICH RESULTS

PAPER	
Table I	stata/code/4-gravity-estim/gravity.do
Table II	matlab/code/prodamen/estimall.do
Table III	matlab/code/cftual/cf_summarize_results.m matlab/code/cftual/Cost-benefit.xlsx
Figure I	Original figure created in ArcGIS
Figure II	stata/code/2-descrip-figures/night-population/gen_graphs_population.do
Figure III	stata/code/2-descrip-figures/night-day-population-rv/gen_graph_pop_day_night_rv.do
Figure IV(a)	stata/code/2-descrip-figures/travel-time-night-pop/gen_graph_travel_time_night.do
Figure IV(b)	matlab/code/commestim/commfigures.m
Figure V	stata/code/3-reduced-form-regs/StationAccess.do
Figure VI	matlab/code/commestim/Empreswplfigure.do
Figure VII	matlab/code/commestim/commfigures.m
Figure VIII(a)	matlab/code/floorestim/ Floorfigure.do
Figure VIII(b)-(c)	matlab/code/prodamen/prodamenfigure.do
Figure IX	matlab/code/cftual/cf_summarize_results.m
APPENDIX	
Figure G1	matlab/code/prodamen/decompfigs.m
Table G1	matlab/code/prodamen/estimall.do
Table H1	matlab/code/cftual/cf_summarize_results.m matlab/code/cftual/Cost-benefit.xlsx
Figure I1	stata/code/2-descrip-figures/public-transport/public-transport.do
Table I1	stata/code/3-reduced-form-regs/StationAccess.do
Table I2	stata/code/3-reduced-form-regs/StationAccess.do
Table I3	stata/code/3-reduced-form-regs/StationAccess.do
Figure I2	stata/code/3-reduced-form-regs/StationAccess.do
Figure I3	stata/code/ 6-UK-historical-occups/graph_borough_inflow_outflow.do
Figure I4	stata/code/ 6-UK-historical-occups/graph_borough_inflow_outflow.do
Figure I5	stata/code/ 6-UK-historical-occups/ graph_UK_historical_occups.do

Figure I6	stata/code/5-other-cites/Paris/create_Paris_pop_graphs.do
Figure I7	stata/code/5-other-cites/Paris/create_Paris_stations_graphs.do
Figure I8	stata/code/5-other-cites/Berlin/ create_pop_emp_graphs_Berlin.do
Figure I9	stata/code/5-other-cites/Berlin/ create_pop_emp_graphs_Berlin.do
Figure I10	stata/code/5-other-cites/Berlin/ create_emp_wpl_res_1925.do
Figure I11	stata/code/5-other-cites/Berlin/ create_transport_graphs_Berlin.do
Figure I12	stata/code/5-other-cites/US-pop-census/ graph-US-city-pop.do
Figure I13	stata/code/5-other-cites/US-commuting-data/US-commute.do
Figure I14	stata/code/5-other-cites/US-pop-census/ graph-US-city-pop.do
Figure I15	stata/code/5-other-cites/US-pop-census/ graph-US-city-pop.do
Figure I16	stata/code/5-other-cites/US-commuting-data/US-commute.do
Figure I17	stata/code/5-other-cites/US-pop-census/ graph-US-city-pop.do
Figure I18	stata/code/5-other-cites/US-commuting-data/US-commute.do
Table I4	stata/code/4-gravity-estim/gravity.do
Figure I19	stata/code/4-gravity-estim/gravity.do
Figure I20	matlab/code/floorestim/Floorestim.m
Figure J1	stata/code/ 7-appendix-figures/time-series-rv/graph_time_series_rv.do
Table J1	Authors' calculations
Figure J2	Original figure created in ArcGIS
Figure J3	Original figure created in ArcGIS
Figure J4	Original figure created in ArcGIS
Figure J5	Original figure created in ArcGIS
Figure J6	Original figure created in ArcGIS
Figure J7	Original figure created in ArcGIS
Figure J8	Original figure created in ArcGIS
Figure J9	Original figure created in ArcGIS
Figure J10	Original figure created in ArcGIS
Table J2	Taken from Appendix B of the "Report From The Joint Select Committee of The House of Lords on London Underground Railways" (1901), compiled by Henry L. Cripps.
Figure J11	stata/code/ 7-appendix-figures/ history-rail-costs/graph_int_comp_construct_costs.do
Figure J12	Original figure created in ArcGIS
Figure J13	Original figure created in ArcGIS
Figure J14	Original figure created in ArcGIS
Figure J15	Original figure created in ArcGIS
Figure J16	Original figure created in ArcGIS
Figure J17	Original figure created in ArcGIS
Figure J18	Original figure created in ArcGIS
Figure J19	Original figure created in ArcGIS
Table J3	Taken from London Statistics 1907-8, Section XXX Locomotion, Table 26, page 398
Table J4	Taken from Royal Commission of London Traffic 1904

Table J5	Taken from London Statistics 1907-8, Section XXX Locomotion, Table 8, Panel (2), page 388
Table J6	Taken from London Statistics 1907-8, Section XXX Locomotion, Table 8, Panel (1), page 388
Table J7	Authors assumed travel time weights

ORDER IN WHICH TO RUN FILES

We now explain the order in which the Stata and Matlab code should be run to replicate all the results in the paper.

1A. Stata Data Generation

Run the following data generation files in Stata

stata/code/1-data-generation/rv-data.do	Prepares the borough-level rateable values data for the quantitative analysis in Sections V-VIII of the paper
stata/code/1-data-generation/prep-matlab.do	Prepares the borough-level data for reading into Matlab for the quantitative analysis in Sections V-VIII of the paper
stata/code/1-data-generation/parish-data.do	Generates the parish-level data for the reduced-form difference-in-differences event-study in Section IVB of the paper
stata/code/1-data-generation/prep-matlab-parish.do	Prepares the parish-level data for reading into Matlab to compute changes in travel time for use in the difference-in-differences event-study in Section IVB of the paper
Stata/code/1-data-generation/borough-inflow-outflow.do	Generates data on borough inflows and outflows of commuters using the bilateral commuting data for 1921 for use in the additional empirical results in Section I4 of the online appendix

1B. Matlab Data Generation

Run the following data generation files in Matlab

matlab/code/prepGIS.m	Reads the main borough-level dataset into Matlab for the quantitative analysis in Sections V-VIII of the paper

matlab/code/parishGIS.m	Reads the parish-level data into Matlab and computes changes in travel time for use in the difference-in-differences event-study in Section IVB of the paper
matlab/code/CityTravelTimeFigure.m	Uses the borough-level data to compute changes in travel time from the construction of the railway network for use in Figure IV in Section IVA of the paper

II. Stata Reduced-Form Figures Evidence

Run the following files in Stata

stata/code/2-descrip-figures/night-population/gen_graphs_population.do	Creates the graph for the night-population in the City of London and Greater London over time in Figure II in Section IVA of the paper
stata/code/2-descrip-figures/night-day-population-rv/gen_graph_pop_day_night_rv.do	Creates the graph for the night and day population and rateable value share for the City of London over time in Figure III in Section IVA of the paper
stata/code/2-descrip-figures/travel-time-night-pop/gen_graph_travel_time_night.do	Creates the graph for the night population and population-weighted travel time for the City of London over time in Figure IV(a) in Section IVA of the paper
stata/code/2-descrip-figures/ public-transport/ public-transport.do	Creates the graph for passenger journeys by public transport per head of the population for Figure I1 in Section I2 of the online appendix

III. Stata Reduced-Form Difference-in-Differences Regression

Run the following files in Stata

stata/code/3-reduced-form-regs/StationAccess.do	Generates the reduced-form event-study results in (i) Figure V in Section IVB of the paper, (ii) Tables I.1, I.2 and I.3 in Section I2 of the online appendix, (iii) Figure I2 in Section I3 of the online appendix

IV. Stata Gravity Estimation

Run the following files in Stata

stata/code/4-gravity-estim/gravity.do	Generates the gravity equation results in (i) Table I in Section VID of the paper and (ii)

	Table I4 and Figure I19 in Section I6 of the online appendix

V. Stata Evidence for Other Cities

stata/code/5-other-cites/Paris/ create_Paris_pop_graphs.do	Generates the figure of metro area and downtown population for Paris (Figure I6) in Section I5 of the online appendix
stata/code/5-other-cites/Paris/ create_Paris_stations_graphs.do	Generates the figure of the number of railway stations over time for Paris (Figure I7) in Section I5 of the online appendix
stata/code/5-other-cites/Berlin/ create_pop_emp_graphs_Berlin.do	Generates the figures of metro area and downtown population (Figure I8) and employment (Figure I9) for Berlin in Section I5 of the online appendix
stata/code/5-other-cites/Berlin/ create_emp_wpl_res_1925.do	Generates the figure of private employment by workplace and residence in 1925 for Berlin (Figure I10) in Section I5 of the online appendix
stata/code/5-other-cites/Berlin/ create_transport_graphs_Berlin.do	Generates the figure of the number of railway stations over time for Berlin (Figure I11) in Section I5 of the online appendix
stata/code/5-other-cites/US-pop-census/ graph-US-city-pop.do	Generates the figures of metro area and downtown population for US cities in Figures I12, I14, I15 and I17 in Section I5 of the online appendix
stata/code/5-other-cites/US-commuting-data/US-commute.do	Generates the figures on journey to work distances for Boston (Figure I13), Manhattan (Figure I16) and Philadelphia (Figure I18) in Section I5 of the online appendix

VI. Stata Evidence on Occupational Employment by Residence

stata/code/ 6-UK-historical-occups/ graph_borough_inflow_outflow.do	Generates the figure comparing borough inflows and outflows of commuters and occupational specialization of employment by residence in Figures I3 and I4 in Section I4 of the online appendix
stata/code/ 6-UK-historical-occups/ graph_UK_historical_occups.do	Generates the figure of the residence-employment-share-weighted distance of occupations from the Guildhall in Figure I5 in Section I4 of the online appendix

VII. Stata Data Appendix Figures

stata/code/ 7-appendix-figures/time-series-rv/graph_time_series_rv.do	Generates the figure with time-series of total rateable value for the County of London in Figure J1 in Section J2 of the online appendix
stata/code/ 7-appendix-figures/ history-rail-costs/graph_int_comp_construct_costs.do	Generates the figure with construction costs per mile for railways in different countries in Figure J11 in Section J6 of the online appendix

VII. Matlab Commuting Parameter Estimation

Run the following file in Matlab to calibrate the Frechet shape parameter in Section VIE of the paper

matlab/code/commestim/commestim.m	Undertakes our baseline quantitative analysis in Section VIE of the paper for a grid of alternative values of the Frechet shape parameter epsilon
matlab/code/commestim/commestimplot.m	Finds the value of epsilon from this grid of parameter values that minimizes the sum of squared deviations between the model's predictions for workplace employment and the data on the day population for the City of London for the census years for which these data are available (1881, 1891 and 1911) in Section VIE of the paper

The above Matlab files run the following files as subroutines

matlab/code/commestim/subroutines/ comexacthat.m	Undertakes our baseline quantitative analysis for a given value of epsilon
matlab/code/commestim/subroutines/ comwagesolve.m	Solves for the historical wage vector that satisfies the combined land and commuter market clearing condition
matlab/code/commestim/subroutines/ comempwplsolve.m	Solves for historical workplace employment given historical wages

VII. Matlab Baseline Quantitative Analysis

Run the following file in Matlab to undertake our baseline quantitative analysis for our calibrated value of the Frechet shape parameter of 5.25 in Sections VIE and VIF of the paper

matlab/code/commestim/commcal.m	Undertakes our baseline quantitative analysis in Section VIE of the paper for our calibrated value of the Frechet shape parameter of epsilon = 5.25
matlab/code/commestim/commfigures.m	Generates Figure IV(b), Figure VII(a) and Figure VII(b) in Sections VIE and VIF of the paper

The above Matlab files run the following files as subroutines

matlab/code/commestim/subroutines/ comexacthat.m	Undertakes our baseline quantitative analysis for a given value of epsilon
matlab/code/commestim/subroutines/ comwagesolve.m	Solves for the historical wage vector that satisfies the combined land and commuter market clearing condition
matlab/code/commestim/subroutines/ comempwplsolve.m	Solves for historical workplace employment given historical wages

matlab/code/tools/cumcommuteprob.m	Computes cumulative commuting probabilities by distance bins
matlab/code/tools/defcommutebin.m	Defines commuting distance bins

Now run the following files in Stata

matlab/code/commestim/commread.do	Reads Matlab commuting data into Stata
matlab/code/commestim/Empreswplfigure.do	Generates Figure VI in Section VIE of the paper

VIII. Matlab Floor Space Estimation

Run the following file in Matlab to solve for the price and quantity of floor space in Section VIIA of the paper

matlab/code/floorestim/Floorestim.m	Uses our calibrated floor space supply elasticity of 1.83 to solve for the price and supply of floor space in Section VIIA of the paper

The above Matlab files run the following files as subroutines

matlab/code/floorestim/subroutines/ floorspace.m	Function to solve for price and supply of floor space

Now run the following files in Stata

matlab/code/floorestim/ Floorread.do	Reads Matlab floor space data into Stata
matlab/code/floorestim/ Floorfigure.do	Generates Figure VIII(a) in Section VIIA of the paper

IX. Matlab Productivity and Amenities Estimation

Run the following files in Matlab to recover productivity and amenities and estimate the strength of agglomeration forces in Sections VIIB and VIIC of the paper

matlab/code/prodamen/prodamen.m	Uses our solutions for the price of floor space to solve for productivity and amenity growth in Section VIIB of the paper
matlab/code/prodamen/decomp.m	Implements the model-based decompositions discussed in Section VIIB of the paper and reported in Section G3 of the online appendix
matlab/code/prodamen/decompfigs.m	Generates Figure G1 in Section G3 of the online appendix for the contribution of changes in commuting costs, the supply of floor space, productivity and amenities to changes in net commuting into the City of London

The above Matlab files run the following files as subroutines

matlab/code/prodamen/subroutines/ prodamenexacthat.m	Function to solve for productivity and amenities
matlab/code/prodamen/subroutines/ cfclosed_exog_decomp.m	Function that solves for counterfactuals for a given total population of Greater London
matlab/code/prodamen/subroutines/ cfwage_exog_decomp.m	Function that solves for wages as part of these counterfactuals

Now run the following files in Stata

matlab/code/prodamen/prodamenread.do	Reads the solutions for productivity and amenities into Stata
matlab/code/prodamen/prodamenfigure.do	Generates Figure VIII(b) and Figure VIII(c) in Section VIIB of the paper for productivity in 1831 and 1921 and amenity growth from 1831-1921
matlab/code/prodamen/combineall.do	Merges Stata datasets with model solutions
matlab/code/prodamen/estimall.do	Generates the estimates of the strength of agglomeration forces in production and residence in Table II in Section VIIC of the paper

X. Matlab Counterfactuals

Run the following files in Matlab to undertake the counterfactuals reported in Section VIII of the paper

matlab/code/cftual/ cf_inelas_exog.m	Solves for counterfactuals for the railway network with an inelastic supply of floor space and exogenous productivity and amenities (Column (1) of Table III in the paper and Column (1) of Table H1 in Section H of the online appendix)
matlab/code/cftual/ cf_elas_exog.m	Solves for counterfactuals for the railway network with our calibrated floor space supply elasticity (mu=1.83) and exogenous productivity and amenities (Column (2) of Table III in the paper and Column (3) of Table H1 in Section H of the online appendix)
matlab/code/cftual/ cf_elas_half_exog.m	Solves for counterfactuals for the railway network with half our calibrated floor space supply elasticity (mu=0.92) and exogenous productivity and amenities (Column (2) of Table H1 in Section H of the online appendix)
matlab/code/cftual/ cf_elas_endog_prod.m	Solves for counterfactuals for the railway network with our calibrated floor space supply elasticity (mu=1.83),

	our estimated agglomeration forces in production (etaL=0.086) and exogenous amenities (Column (3) of Table III in the paper)
matlab/code/cftual/ cf_elas_endog_prod_amen.m	Solves for counterfactuals for the railway network with our calibrated floor space supply elasticity (mu=1.83), our estimated agglomeration forces in production (etaL=0.086) and residence (etaR=0.172) (Column (4) of Table III in the paper)
matlab/code/cftual / cf_summarize_results.m	Summarizes the results of the counterfactuals in Section VIII of the paper. See also matlab/code/cftual/Cost-benefit.xlsx

The above Matlab files run the following files as subroutines

cf_inelas_exog.m, cf_elas_exog.m cf_elas_half_exog.m	
matlab/code/cftual_nontraded/subroutines/ cfwage_exog.m	Computes the wage vector as part of the equilibrium with exogenous productivity and amenities
matlab/code/cftual_nontraded/subroutines/ cfsupply_exog.m	Computes the equilibrium for a given total city population with exogenous productivity and amenities
cfL_supply_exog.m	Computes endogenous total city population with exogenous productivity and amenities
cf_elas_endog_prod.m, cf_elas_endog_prod_amen.m,	
matlab/code/cftual_nontraded/subroutines/ cfwage_endog.m	Computes the wage vector as part of the equilibrium with endogenous productivity and amenities
matlab/code/cftual_nontraded/subroutines/ cfsupply_endog.m	Computes the equilibrium for given total city population with endogenous productivity and amenities
matlab/code/cftual_nontraded/subroutines/ cfL_supply_endog.m	Computes endogenous total city population with endogenous productivity and amenities
All files	
matlab/code/cftual_nontraded/subroutines/ keep.m	Function file to keep variables in Matlab

See also the following file for more information about the order in which to run the Stata files

Stata/code/RunAllDoFiles.do