Online Appendix for

Home Away From Home? Foreign Demand and London House Prices

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Figure A.1

Foreign-born people shares in London

The figure reports the overall shares of foreign-born people in London. We use these shares in order to construct weighted averages of variables.

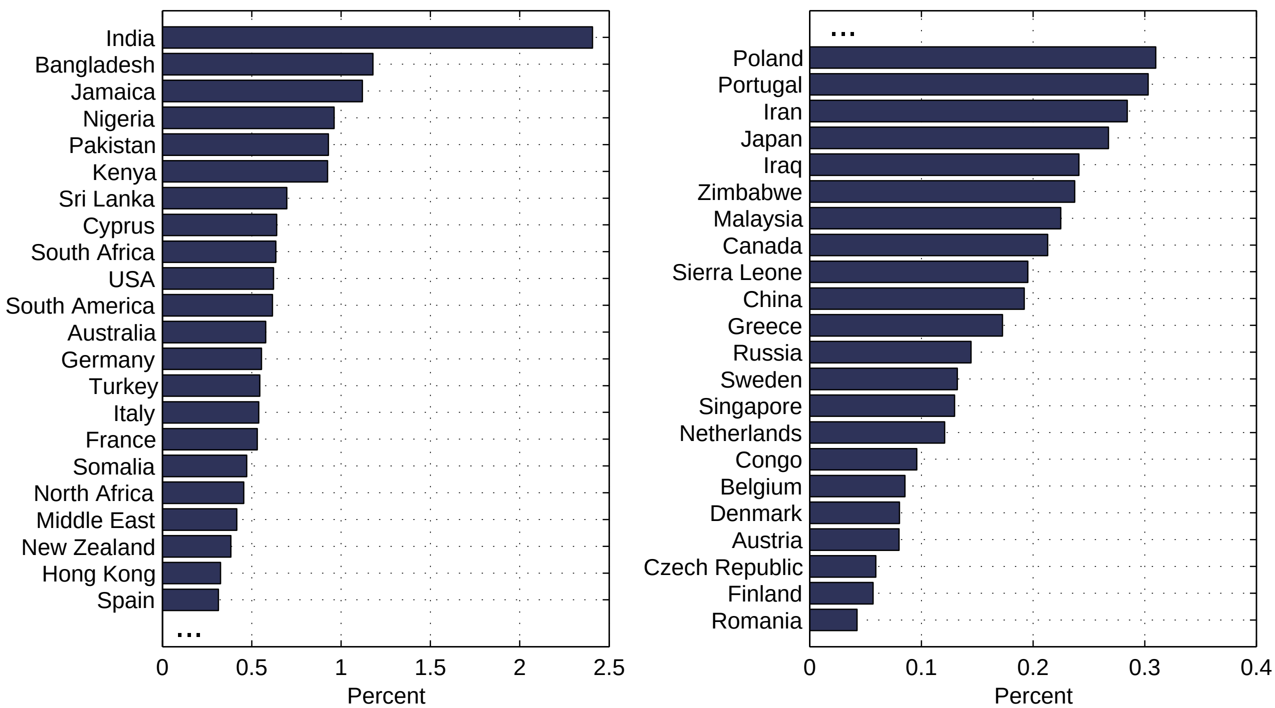


Figure A.2

Average levels of political risk

The figure reports average levels of political risk, as captured by the ICRG indexes. In our estimation, we distinguish between countries with high political risk (higher than a threshold of 20) and low political risk (lower than 20). We adjust the raw index series reported by the PRS Group by subtracting them from a total value of 100. This insures that we can interpret higher index values as increases in risk.

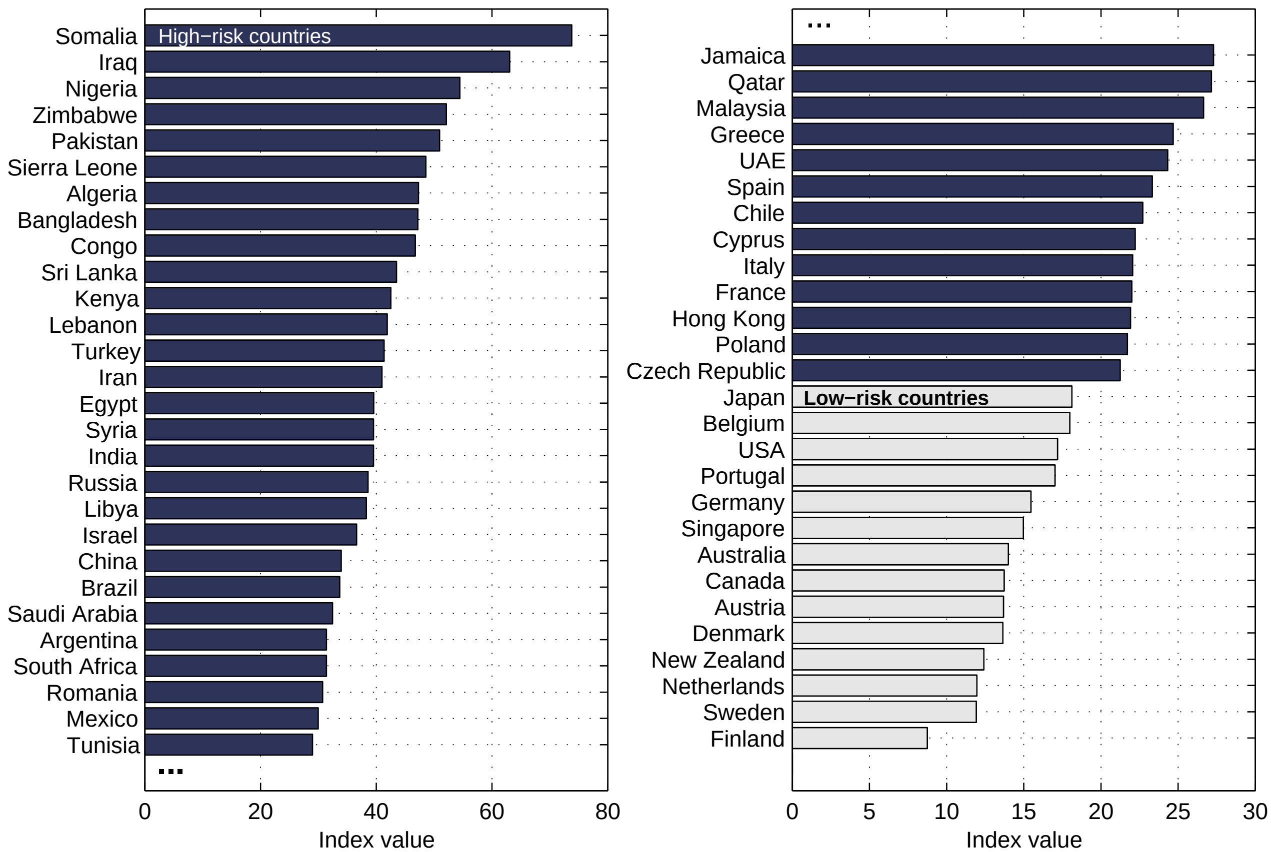


FIGURE A.3

Cross-ward distribution of demographic, social and economic variables

The figure shows the distribution of selected variables, across the set of 624 London wards. We report the unit of measurement in parentheses, below the variable name.

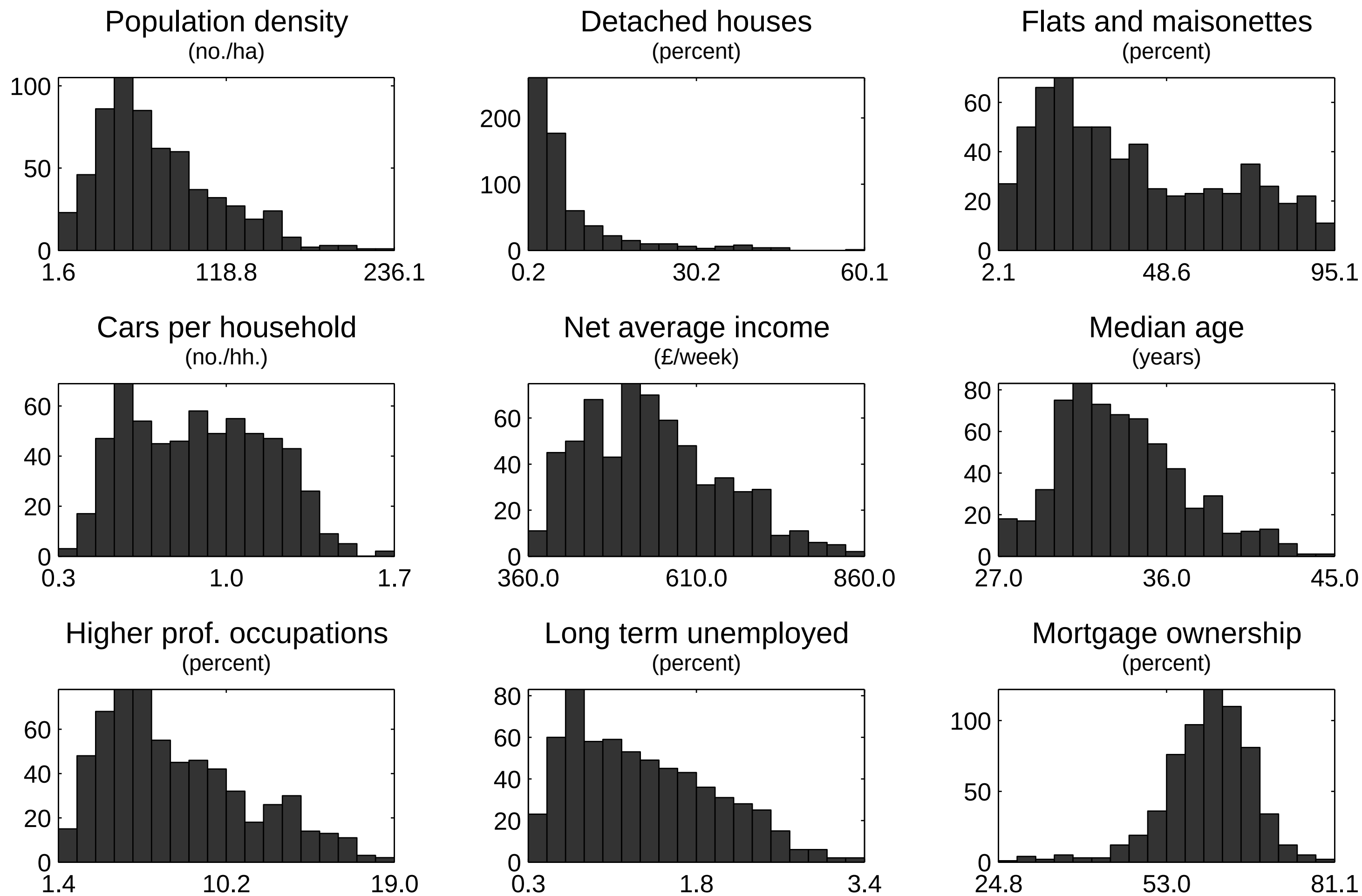


Figure A.4
Cross-ward distribution of the foreign-born people shares

The figure shows the distribution of the shares of people born in respective countries or country groups, across the set of 624 London wards. We report the shares in percent of the total ward population.

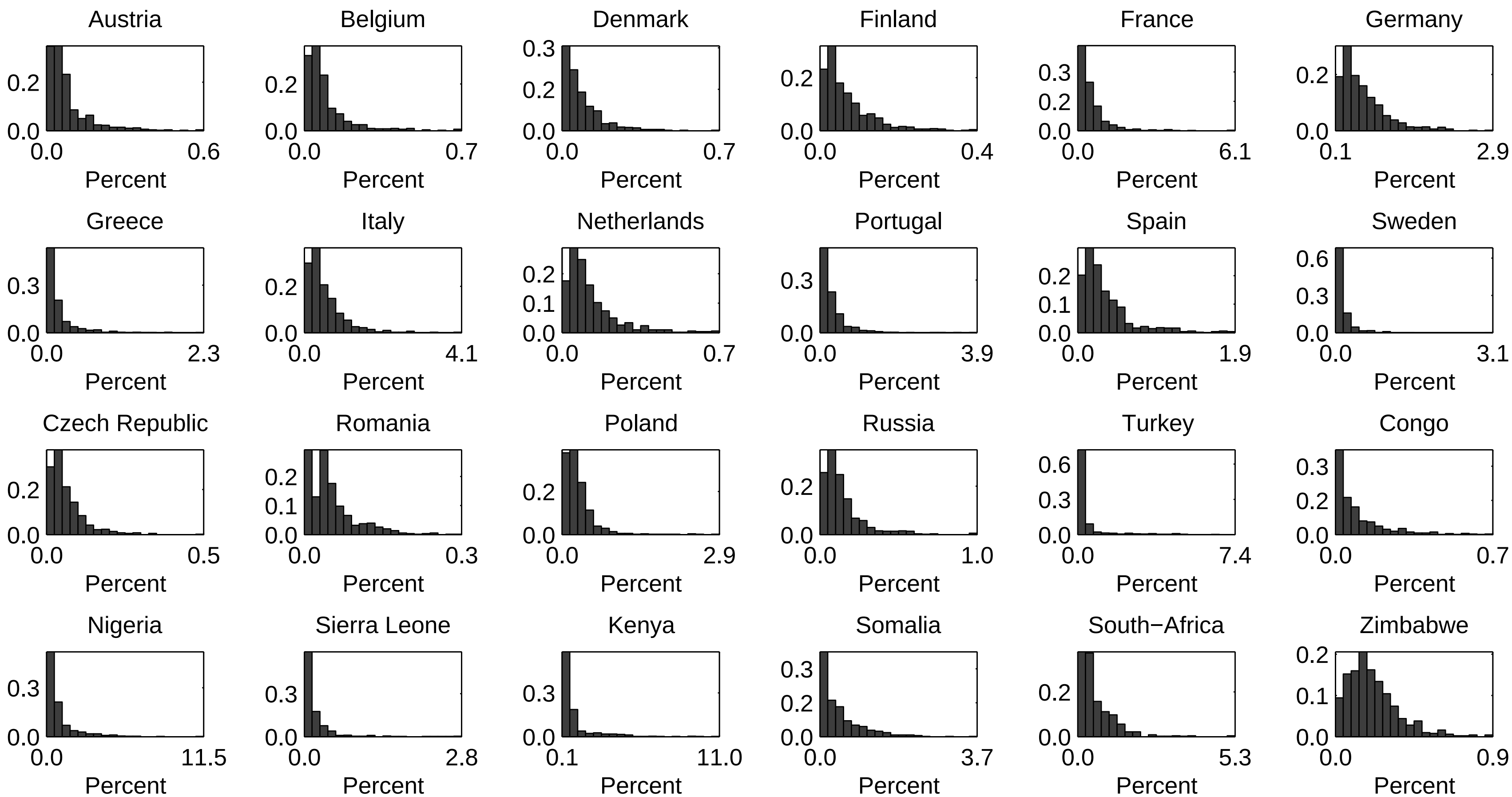


Figure A.4
Cross-ward distribution of the foreign-born people shares
(continued)

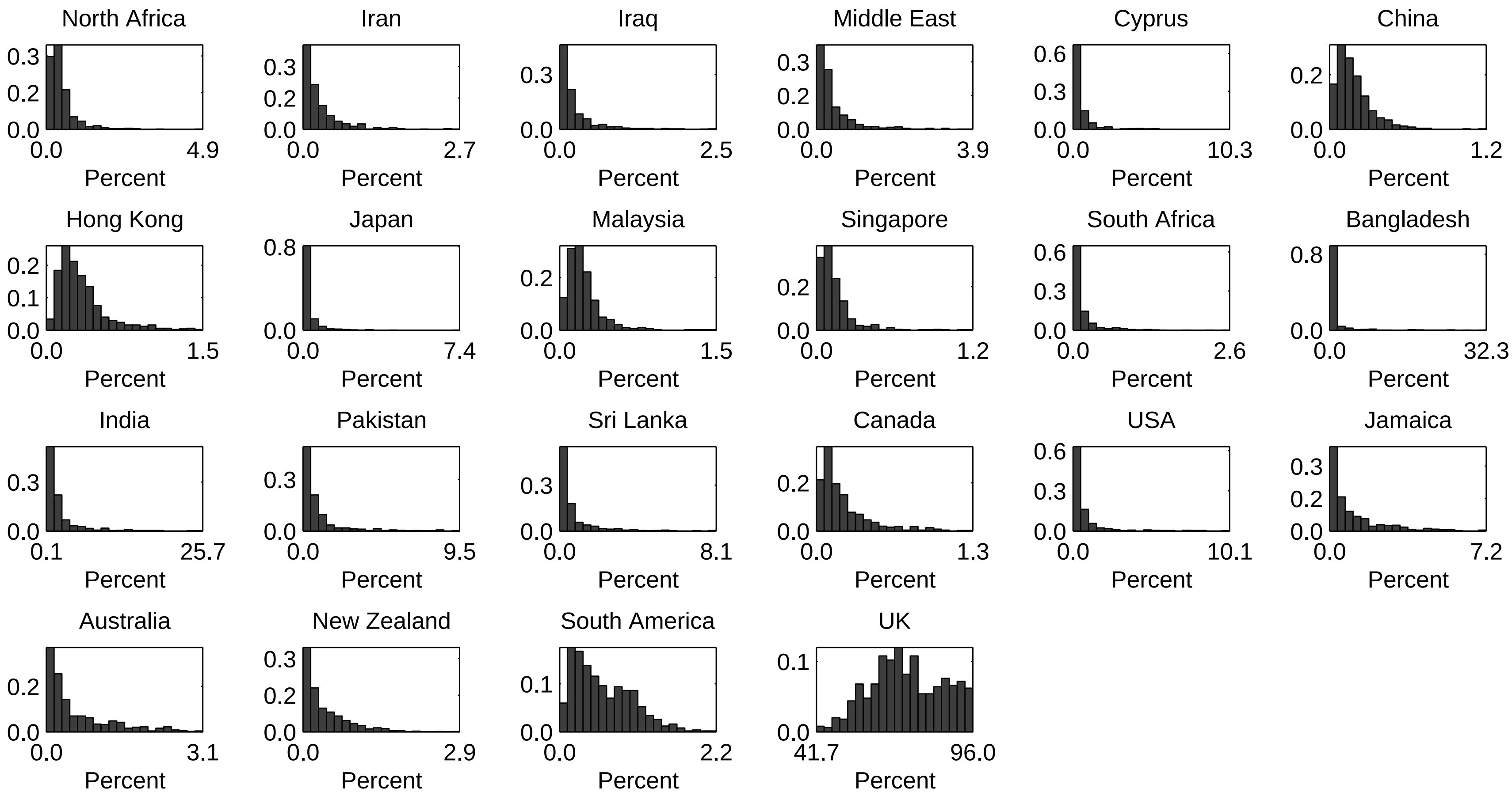


Figure A.5

Time series of capital flows into London's commercial real estate market

The figure reports the evolution of capital inflows into the London commercial real estate market and their relationship with political risk. The data source is Real Capital Analytics. We report the sum of the total inflows from our sample countries with relatively high levels of political risk, as listed in Figure A.2.

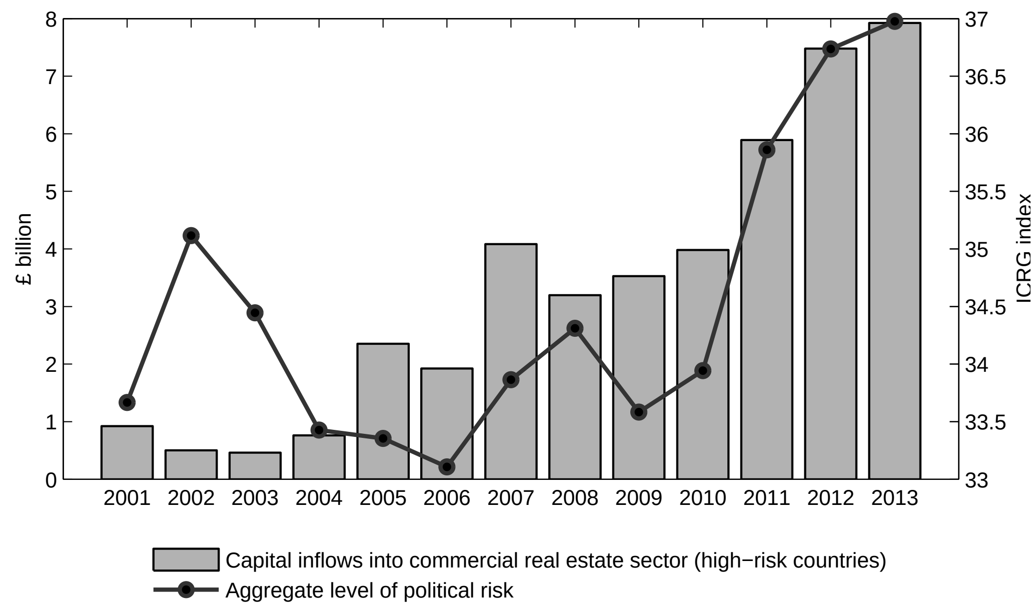


Figure A.6

Foreign political risk and migration into the UK

In this figure, we report the number of additional visas granted by the UK in 2013, relative to 2008. The line indicates univariate cross-country fitted values. On the horizontal axis, we report the change in political risk (measured by the ICRG index) between 2008 and 2013. In this representation, we exclude countries for which the number of visas or the number of people which enter the UK are equal to zero.

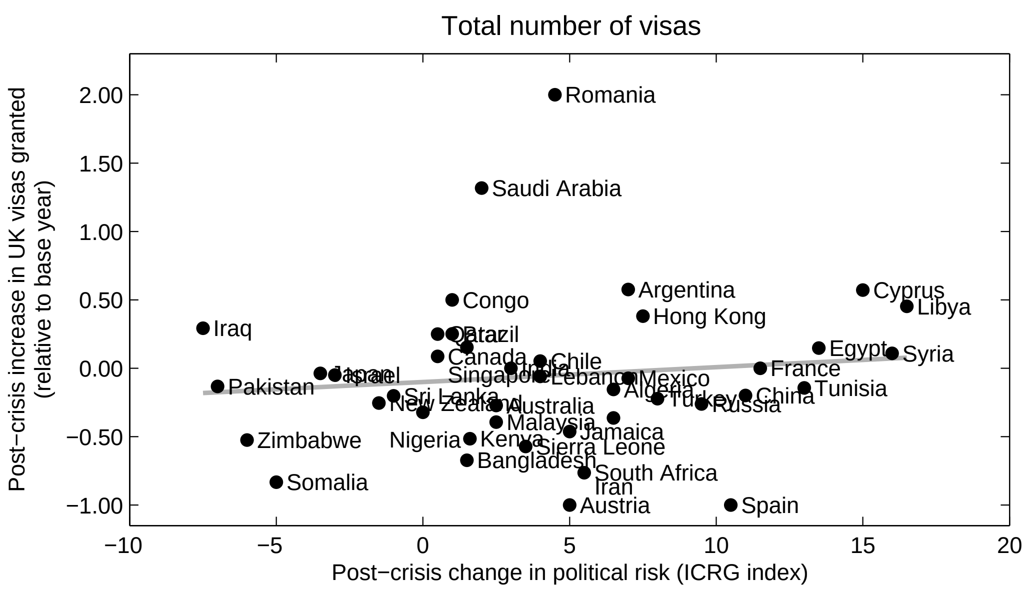


FIGURE A.7

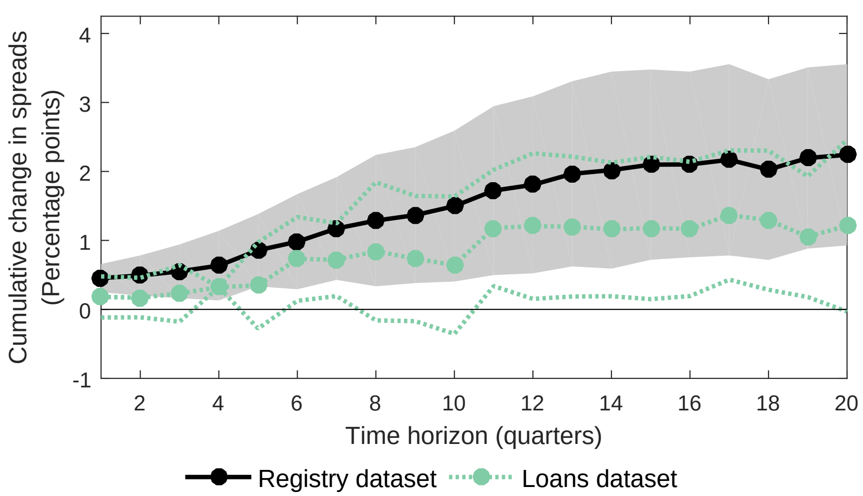
Robustness check: clustering at the level of world regions

The figure reports the estimated average response of house prices in wards with high shares of foreign born people, following a shift to the high-risk regime. The empirical specifications corresponds to the following equations:

$$\Delta s_t^k = \mu^k + \delta_t + \rho \Delta s_{t-1}^k + \sum_{l=1}^{L} \zeta_l z_{t-l}^k + u_t^k, \quad \text{and} \quad \Delta \nu_t^k = \omega^k + \tau_t + \gamma \Delta \nu_{t-1}^k + \sum_{l=1}^{L} \eta_l z_{t-l}^k + \epsilon_t^k,$$

where z_t^k is the risk indicator of the ICRG index of political risk. In our benchmark specification, we consider the case $L = 20$ quarters. In Panel B, we report analogous impulse responses for the cross-ward spreads in transaction volumes and mortgage originations. The gray shaded areas (Registry dataset) and the dotted lines (Loans dataset) indicate 90% confidence intervals, based on double clustered standard errors at the region and year level. We determine the statistical significance of accumulated impulse responses and impute corresponding confidence intervals based on the critical values of the F-test.

Panel A



Panel B

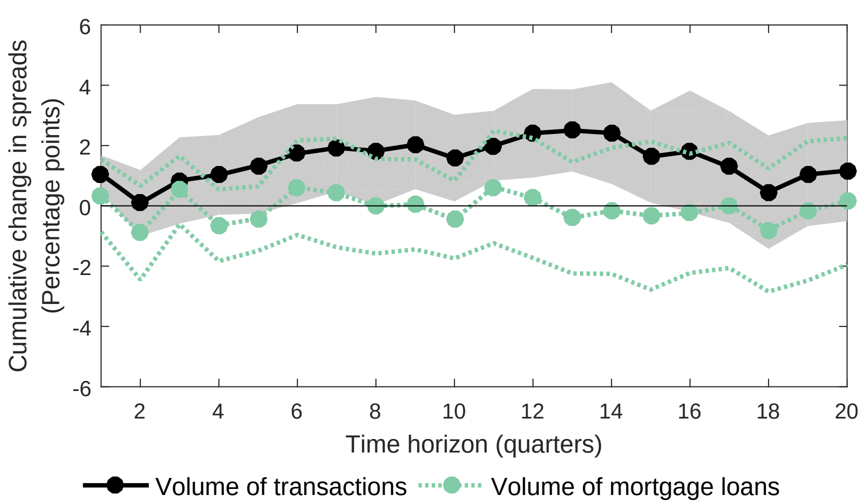


Figure A.8

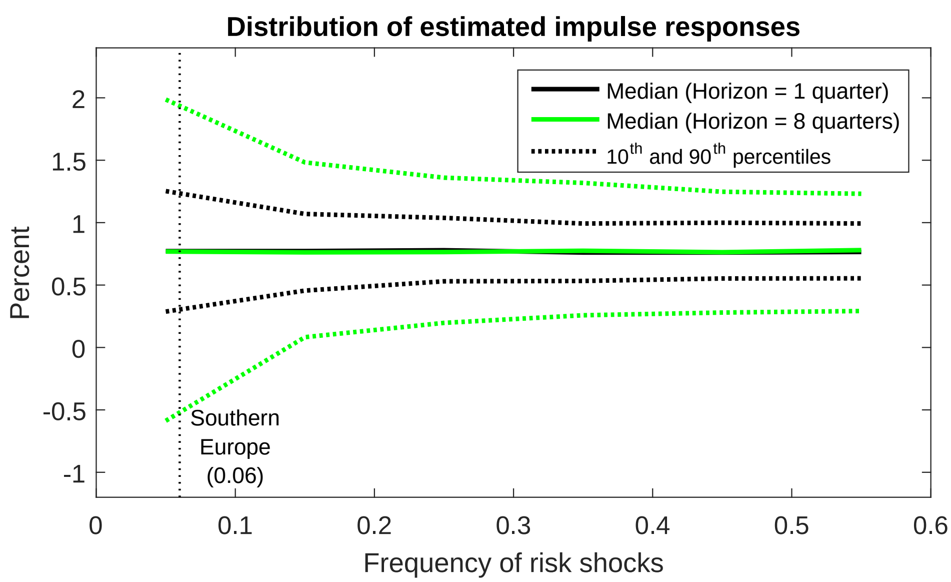
Simulation results: Identification of effects at different horizons

The table reports the distribution of estimated impulse responses across $N = 2,000$ Monte Carlo draws, based on the following assumption about the data-generating process:

$$\Delta s_t = \rho \Delta s_{t-1} + \sum_{l=1}^{L} \zeta_l z_{t-l} + u_t.$$

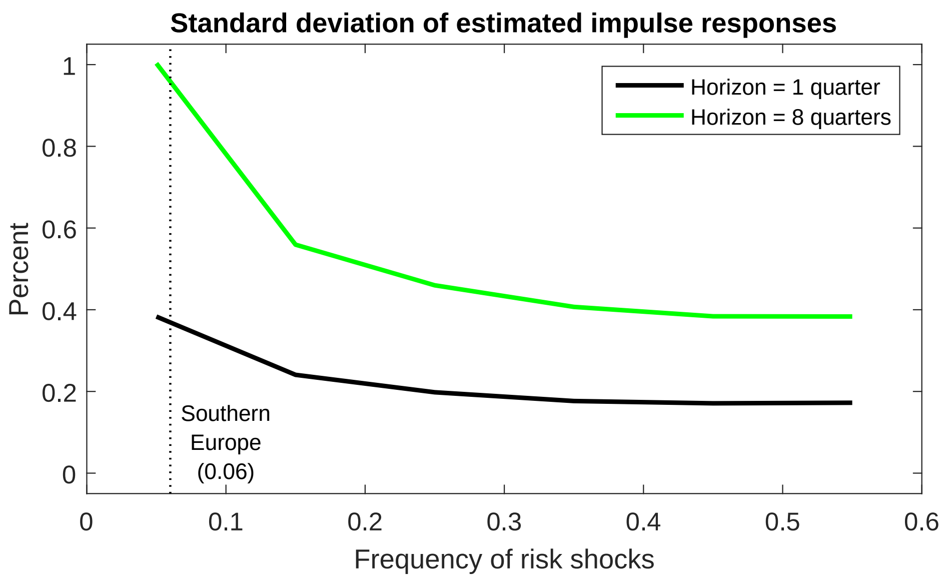
Here, z_t is a random binary variable $\left(z_t \in \{0,1\}\right)$, that takes the value of 1 for a share q of the sample. We repeat the simulation for a set $q \in \{0.05, ..., 0.55\}$ (see horizontal axis). We further calibrate $\rho = -0.11$ and $u_t \sim N(0, 1.45)$, as estimated from our benchmark specification. We choose the number of observations $T = 275$ to correspond to the number of observations in our sample for the Southern Europe region. As in the benchmark specification, $L = 20$ quarters. For simplicity, we set $\zeta_1 = 1$ and $\zeta_l = 0$, for $l > 1$, which corresponds to a flat impulse response profile. In Panel A, we report median estimates (thick lines) and respective 90^{th} percentiles (dotted lines). In Panel B, we report the standard deviation of estimated impulse responses across the full set of N replications. The dark black lines show estimated impulse responses for a horizon of 1 quarter, and light green lines for a horizon of 8 quarters. The vertical dotted lines indicate the actual frequency of risk shocks $q = 0.06$ for the Southern European region. In Panel C, we repeat the exercise by varying the persistence of the risk shock. In each period t, we draw a random risk shock. With a probability ρ, the risk regime continues in period $t+1$. With a probability $1-\tau$, a new shock is re-drawn. By construction, the frequency of the risk shock is 50% in this case. The dark black lines show estimated impulse responses for a horizon of 1 quarter, and light green lines for a horizon of 8 quarters. The vertical dotted lines indicate the actual persistence of risk shocks $\tau = 0.07$ for the Southern European region.

Panel A



Simulation results: Identification of effects at different horizons (continued)

Panel B



Simulation results: Identification of effects at different horizons (continued)

Panel C

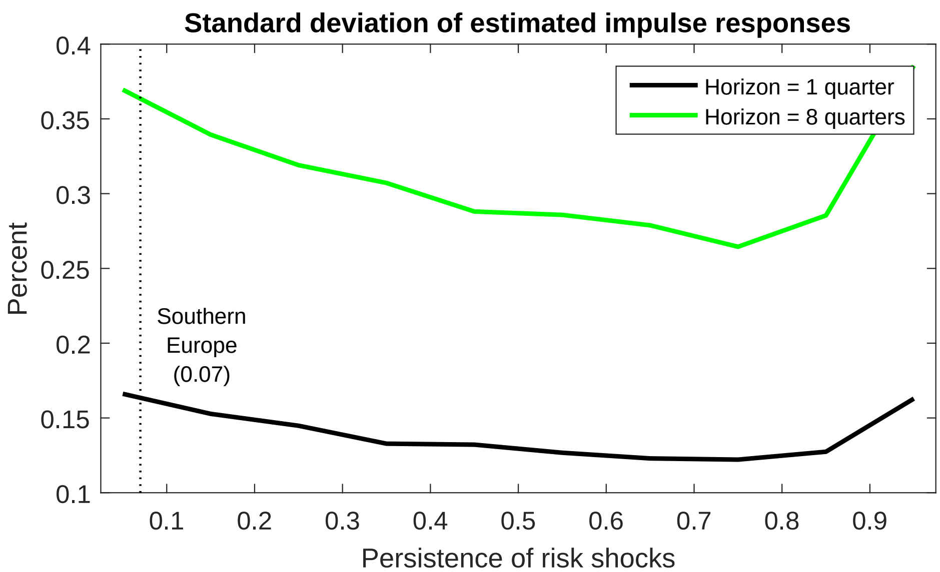


Figure A.7
Nationalities of buyers in the Prime Central London area

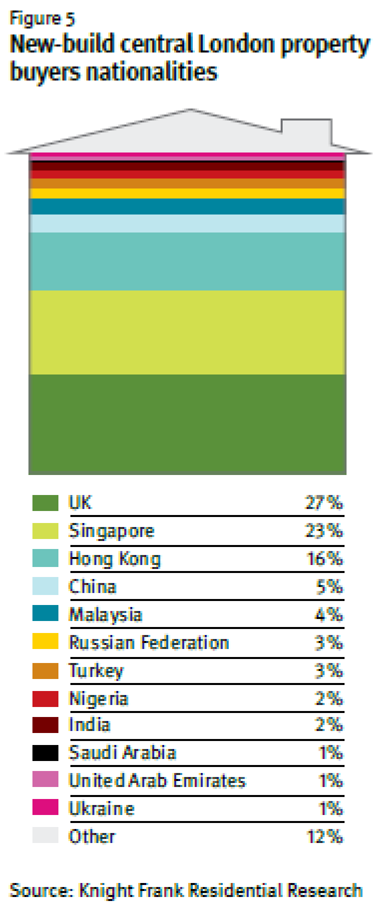


TABLE A.1

Summary statistics across wards

The table reports mean values for selected variables, calculated for the wards in the top quintile of the respective distributions, according to the share of people born in our set of country regions. The population density is calculated using the usual resident population and the size of the area in hectares. The market share of flats indicates all people who were usually resident in the area at the time of the 2001 census, who lived in an unshared dwelling, that was a flat, maisonette or apartment, as a percent of the total ward population. Net average income levels are estimated by the UK Office for National Statistics and expressed in pounds sterling per week. The information on vehicle ownership is based on the number of cars or vans owned, or available for use, by one or more members of a household, including company cars or vans available for private use. The share of people in higher professional occupations is reported as classified by the UK Office for National Statistics. The ward-level degree of mortgage ownership is given by the number of households in the area at the time of the 2001 census, who are holders of a residential mortgage, as a fraction of the total number of homeowners.

		Population density *(no/ha)*	Market share of flats *(percent)*	Net income *(£/week)*	Cars per household *(no/hh.)*	Higher prof. occupations *(percent)*	Mortgage holders *(percent)*
Top 20% of wards with highest shares of people born in:	Southern Europe	110.99	68.51	580.80	0.63	10.86	55.71
	Eastern Europe	85.56	50.59	603.28	0.81	10.60	55.41
	Russia	94.08	59.84	590.08	0.73	10.85	54.81
	Middle East	90.17	54.38	537.10	0.73	8.51	57.16
	Africa	77.09	40.36	490.24	0.82	6.27	61.35
	South Asia	76.17	34.04	497.10	0.86	6.22	61.24
	Asia-Pacific	97.42	62.38	641.28	0.73	12.74	54.92
	South and Central America	89.76	48.87	484.24	0.68	6.52	63.81
	UK	38.04	14.95	553.20	1.15	4.92	58.86
Full sample of wards		70.68	39.41	546.14	0.88	7.62	59.88

TABLE A.2

Robustness of the results

The table reports estimated cumulative impulse responses of cross-ward price spreads to a foreign risk shock, based on the following model specification:

$$\Delta s_t^k = \mu^k + \delta_t + \rho \Delta s_{t-1}^k + \sum_{l=1}^{L} \zeta_l z_{t-l}^k + u_t^k,$$

where z_t^k is an indicator variable which takes the value of one if the respective risk measure is in the high-risk regime. We report impulse responses at a horizon of 2 years (8 quarters). The estimated impulse responses are multiplied by 100, for easier interpretation as percentage points. We use clustered standard errors at the country and year level. *, **, *** denote statistical significance at the 10%, 5%, and 1% level respectively.

Robustness check: Property characteristics x ward fixed effects	
Foreign demand effect	1.27**

Robustness check: Benchmark estimation excluding France	
Foreign demand effect	1.29**

Placebo test: Benchmark estimation for low-risk countries	
Foreign demand effect	-0.35

Table A.3

The role of individual components of the ICRG risk index

Panel A reports the contribution of each of the 12 individual components to the total variation of quarterly changes of the ICRG index. Panel B reports estimation results from the following estimation specification:

$$\Delta s_t^k = \mu^k + \delta_t + \rho \Delta s_{t-1}^k + \sum_{j=1}^{J=12} \zeta_j Z_{t-1}^k + u_t^k,$$

where Z_t^k is the level of the ICRG index of political risk in quarter t in country k. We use double clustered standard errors at the country and year level. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A

Variance decomposition of quarterly ICRG growth rates

Government instability	19.8%
Internal conflict	17.3%
Investment profile	17.0%
External conflict	12.1%
Socioeconomic conditions	7.2%
Democratic accountability	6.9%
Law and order	4.6%
Military in politics	4.5%
Corruption	4.0%
Ethnic tensions	3.7%
Religion in politics	2.1%
Bureaucratic quality	0.8%

Panel B

Contribution of individual ICRG components to foreign demand effects

Religion in politics	0.184*
External conflict	0.120**
Internal conflict	0.080*
Investment profile	0.075**
Bureaucratic quality	0.059
Socioeconomic conditions	0.021
Ethnic tensions	0.007
Military in politics	-0.019
Government instability	-0.031
Corruption	-0.090
Democratic accountability	-0.114
Law and order	-0.256*

Table A.4
Cross-ward correlation between country of birth and ethnic group

The table reports correlation coefficients between the ward-level share of people born in a given country and the share of the respective ethic group, relative to the total population of the ward. The difference between the two is that the latter measure also includes UK citizens and those that were born in the UK, but which belong to an ethnic group defined by the country of origin of their ancestors. We are only able to compute these statistics for a small subset of the countries/world regions because the ethnic composition is recorded in the 2001 census just for the nationalities/ethnic groups listed below.

Bangladesh	0.9991
Pakistan	0.9948
India	0.9751
China	0.8148
Africa	0.7579

Table A.5
The role of isolated risk events

The table reports estimated cumulative impulse responses of cross-ward price spreads to a foreign risk shock, based on the following model specification:

$$\Delta s_t^k = \mu^k + \delta_t + \rho \Delta s_{t-1}^k + \sum_{l=1}^{L} \zeta_l z_{t-l}^k + \sum_{l=1}^{L} \xi_l \bar{z}_{t-l}^k + u_t^k.$$

Here, $\bar{z}_t^k$ is an indicator variable which takes the value of one if two conditions are met: i) the ICRG index is in the high-risk regime in quarter t and ii) the ICRG index is not in the high-risk regime in any of h quarters before and after t. We report impulse responses at a horizon of 2 years (8 quarters). The estimated impulse responses are multiplied by 100, for easier interpretation as percentage points. We use clustered standard errors at the country and year level. *, **, *** denote statistical significance at the 10%, 5%, and 1% level respectively.

	$\bar{z}_t^k = 1$ if no other risk event within:				
	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters
Foreign demand effect	1.30**	1.35**	1.35**	1.37**	1.35**
- Isolated events	1.12	1.11	0.76	0.70	0.65
Number of obs.	1705	1705	1705	1705	1705
Adj. R^2	0.38	0.38	0.38	0.38	0.38

Table A.6
Explaining cross-regional heterogeneity

The table reports estimated coefficients from the following panel regression specification:

$$\Delta s_t^k = \mu^k + \delta_t + \rho \Delta s_{t-1}^k + \sum_{l=1}^{L} \left(\zeta_l + \sum_{j=1}^{4} \xi_{j,l} F_j^k \right) z_{t-l}^k + u_t^k,$$

where the F^k variables are measures of population concentration within the city (calculated as cross-ward standard deviations), relative levels of riskiness (calculated as average levels of the ICRG index), inbound capital flows (calculated as relative contributions of different regions to total transaction volumes of commercial property in London) and inbound immigration flows (calculated as relative contributions of different regions to total registrations with National Insurance in London). For the two latter variables, we use region-level averages for each country in a given region. We report accumulated impulse responses for the horizons indicated in the column header. The estimated impulse responses are multiplied by 100, for easier interpretation as percentage points. Inference on the statistical significance of accumulated impulse responses is based on two-stage bootstrap standard errors, double-clustered at the country and year level. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	1 quarter	1 year	Benchmark 2 years
Unconditional effect	-0.90	-1.70	-1.85
Interaction terms:			
- Concentration within city	0.12	0.00	-0.21
- Absolute level of riskiness	0.58	1.31	1.52
- Inbound capital flows	1.40	5.18	2.29
- Inbound immigration flows	2.54	2.33	5.47*
Country fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	1,705	1,705	1,705
Adj. R2	0.37	0.37	0.42

Table A.7
Overview of sample composition

	Number of obs. in high-risk regime	Relative freq. of high-risk regime	Persistence of risk regime	Number of observations
Africa	65	16.9%	0.29	385
South-Asia	43	19.5%	0.10	220
Middle East	37	13.5%	0.16	275
Southern Europe	15	5.5%	0.07	275
South-America	12	10.9%	0.24	110
Eastern Europe	7	4.2%	0.12	165
Russia	7	12.7%	0.21	55
Asia-Pacific	7	3.2%	0.17	220
Total	193	11.3%	0.19	1705

Table A.8

Determinants of foreign demand effects across world regions

Panel A reports measures of inbound capital flows (calculated as relative contributions of different regions to total transaction volumes of commercial property in London), population concentration within the city (calculated as cross-ward standard deviations), absolute levels of riskiness (calculated as average levels of the ICRG index) and inbound immigration flows (calculated as relative contributions of different regions to total registrations with National Insurance in London). The data sources are the commercial property transactions database provided by Real Capital Analytics, the Office of National Statistics, and the PRS Group. Panel B reports the relative measure of population concentration, calculated as the cross-ward standard deviation of foreign-born people shares, divided by the respective cross-ward mean.

Panel A

Population concentration within the city	
South-Asia	2.22
Middle East	0.60
Africa	0.59
South-America	0.59
Southern Europe	0.41
Asia-Pacific	0.32
Russia	0.14
Eastern Europe	0.14

Absolute level of riskiness	
Africa	45.70
South-Asia	45.29
Russia	38.59
Middle East	36.96
South-America	29.01
Eastern Europe	24.57
Southern Europe	21.77
Asia-Pacific	20.29

Inbound commercial property capital flows	
Middle East	36.2%
Asia-Pacific	32.5%
Southern Europe	21.1%
Russia	5.1%
South-Asia	4.8%
South-America	0.2%
Eastern Europe	0.1%
Africa	0.0%

Inbound immigration flows	
Eastern Europe	31.4%
South-Asia	21.6%
Southern Europe	19.0%
Asia-Pacific	11.4%
Africa	9.7%
Middle East	3.8%
South-America	2.4%
Russia	0.6%

Determinants of foreign demand effects across world regions (continued)

Panel B

Population concentration within the city (relative measure)	
South-Asia	1.80
Middle East	1.50
Africa	1.16
Southern Europe	1.13
Asia-Pacific	1.05
Eastern Europe	0.99
Russia	0.95
South-America	0.94

Bootstrap procedure

For each of the $N = 2,000$ iterations, we start with residual bootstrap samples drawn from the transactions and loans datasets. We then construct a panel of estimated house price spreads s_t^k for each country k and quarter t. To account for the clustering of panel observations s_t^k in the second stage, we employ the procedure described by Cameron and Miller (2015). We estimate equation (3) in three new separate residual bootstrap samples, and clusters are defined by the country level, the year level and the country cross year level, respectively. This procedure involves estimating $3N$ panel regressions for each model specification, and it delivers 3 estimated variance matrices. The final variance-covariance matrix is computed as the sum of the variance-covariance matrices obtained with clustering at the country and year level, subtracting the variance-covariance matrix obtained with clustering at the country cross year level. In some few cases, in the estimation of equation (6), we need to drop the extreme 10% of bootstrap draws, to insure that the estimated variance matrix is positive definite. We note that this two-stage correction is only necessary for the estimation of price effects. There is no first-stage estimation error in the computation of cross-ward volume spreads.

Immigration and House Prices

One of the possibilities we consider in our specifications is that cross-border property investments into London are driven purely by a desire to move capital away from regions with high political and economic uncertainty, without any associated immigration of foreign purchasers into London. Yet another possibility is that safe-haven property investments incorporate an implicit or explicit future consideration by purchasers of future London-bound immigration. If this is indeed the case, when political or economic risks actually materialize, relatively fast moving capital flows towards London properties may be followed by relatively slow-moving subsequent increases in immigration. We therefore investigate whether price increases in wards with higher shares of foreign-born people are a signal of increased future immigration into those wards.

Any such immigration might be expected to occur at a much lower frequency than the safe-haven price effects, with longer-lasting effects on the demographic structure of London. Given data availability, we use the U.K. Office for National Statistics census information recorded in 2001 and 2011 to test this hypothesis.

We estimate the following regressions:

$$\Delta f^k_{w,2011} = \alpha + \rho^k f^k_{w,2001} + \pi^k_1 \Delta \ln P_{w,2001} + e^k_{w,2011}, \quad \text{(A.1)}$$

$$\Delta f^k_{w,2011} = \alpha + \rho^k f^k_{w,2001} + \pi^k_2 \Delta \ln \bar{P}_{w,2001} + \pi^k_3 \Delta u_{w,2001} + e^k_{w,2011}. \quad \text{(A.2)}$$

In these regressions, $\Delta \ln P_{w,2001}$ is the actual log price change between 1996 and 2001 in ward w, computed by equal-weighting prices of all properties transacted in ward w in each of those years. $\Delta \ln \bar{P}_{w,2001}$ and $\Delta u_{w,2001}$ are constructed by controlling for variation in price-impacting hedonic characteristics of properties at the ward level. $\Delta \ln \bar{P}_{w,2001}$ is the change in the fitted value of the price arising from hedonic price regressions in 1996 and 2001 and $\Delta u_{w,2001}$ is the difference in the residuals from these regressions between these two time periods.

In our interpretation of the results, we identify the coefficient π^k_3 with safe-haven demand effects for the purposes of this auxiliary exercise. We are limited by the fact that we only have two available vintages of the census data, from 2001 and 2011. Consequently, we are only able to run a cross-sectional regression to explain variation in the immigration share between these two vintages. This means that we cannot use time-variation in economic and political risk in our attribution of the impacts of safe-haven demand effects on price, and hence, we simply attribute unexplained-by-hedonics variation in prices between 1996 and 2001 ($\Delta u_{w,2001}$) to safe-haven demand effects. If other factors are responsible for this unexplained variation in prices, as long as they are uncorrelated with future immigration, we would expect them to act as classical measurement error, biasing π_3^k towards zero.

Together, specifications (A.1) and (A.2) allow us to check whether price changes have a role in predicting subsequent changes in future immigration over and above the lagged level of immigrants from country k residing in ward w. These regressions, while interesting, are only able to provide suggestive evidence on the interplay between house prices and immigration patterns, both across wards and through time. Figure A.8 shows estimates of equations (A.1) and (A.2). The figure shows that price changes in wards occurring between 1996 and 2001 are a statistically significant and positive predictor of immigration occurring thereafter from Spain, Italy, Portugal, and China. The first bar in these plots corresponds to actual pre-2001 price changes, while the second bar corresponds to the component of the price changes which is unexplained by property and ward characteristics. It is clear from these plots that the variation in hedonic characteristics between 1996 and 2001 is not responsible for the predictive power of prices for the immigration shares. These results are consistent with safe-haven demand causing price pressure in ward-level house prices which subsequently results in immigration flows from these countries. However, it is worth noting here that we view this part of the analysis as far less precise than our earlier specifications which explain house price movements.

The figures also show that these unexplained price changes are negative forecasters of immigration from the South Asian countries. This highlights another important limitation of this analysis of immigration, namely, that unexplained changes in ward-level prices may be generated by a number of potential determinants, including safe haven flows from other countries. This in turn might act as a deterrent to relatively less well-off immigrants from other regions of the world. So, for example, if certain wards experienced unusual price increases from 1996 to 2001 on account of safe-haven demand from, say, Russia, and if immigrants from, say, Sri Lanka shied away from wards with high price increases not caused by their own house purchases, then this would explain the negative coefficients π_3^k that we detect for Sri Lanka.

Figure A.8

Relationship between house prices and immigration shares

The figure reports the coefficients π_1^k and π_3^k from the regressions:

$$\begin{aligned}\Delta f_{w,2011}^k &= \alpha + \rho^k f_{w,2001}^k + \pi_1^k \Delta \ln P_{w,2001} + e_{w,2011}^k, \text{ and} \\ \Delta f_{w,2011}^k &= \alpha + \rho^k f_{w,2001}^k + \pi_2^k \Delta \ln \bar{P}_{w,2001} + \pi_3^k \Delta u_{w,2001} + e_{w,2011}^k.\end{aligned}$$

Here, $\Delta \ln P_{w,2001}$ is the actual log price change between 1996 and 2001 in ward w, computed by equal-weighting prices of all properties transacted in ward w in each of those years. $\Delta u_{w,2001}$ is the residual price change in ward w, constructed by controlling for variation in price-impacting hedonic characteristics of properties at the ward level. $\Delta \ln \bar{P}_{w,2001}$ is the component of total price changes which can be attributed to changes in characteristics between the two time periods. The price variables are normalized by subtracting the in-sample mean and dividing by the standard deviation. The estimation sample consists of the 624 London wards. The total length of the bars indicates point estimates and the shaded areas correspond to 95% confidence intervals. The estimated standard errors are White heteroskedasticity-robust.