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The Geography of the Global Super-Rich

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Richard Florida and Charlotta Mellander*

*Corresponding author

Florida (florida@rotman.utoronto.ca) is Director of the Martin Prosperity Institute at the University of Toronto's Rotman School of Management and Research Professor at NYU. Mellander is professor of economics, Jönköping International Business School, Jönköping University (charlotta.mellander@ju.se). The authors thank Isabel Ritchie for research assistance.

Introduction

Over the past decade or so, there has been increasing concern over rising inequality and the growth of the "1 percent" of super-rich people who sit atop the global economy (Freeland, 2012; Hardoon, 2015; Hay, 2013; Piketty, 2014; West, 2014). Piketty (2014) has identified the returns to capital held by the super-rich as a key source in rising wealth inequality. A study by Oxfam International (2017) suggests that the world's eight richest people have wealth that is equivalent to that of the entire bottom half of the world's population. Freeland provides a host of qualitative information on the rise of the super-rich around the world (Freeland, 2012). Beaverstock and Hay collect a variety of studies on the growth and geography of the super-rich across the globe – suggesting the super-rich are not just a class in and of themselves, but also take on a particular geography or spatial patterning across and within cities (Hay and Beaverstock, 2016). Several recent studies examine the location and geographic distribution of the super-rich across global cities and metropolitan areas (Freund and Oliver, 2016; Hay, 2013)

We build on this literature to examine the factors associated with the location and geographic organization of the super-rich across global metro areas. We define the super-rich as the relatively small number of billionaires across the world. Other studies look at the 1 percent (Credit Suisse, 2018) or identify ultra-high net worth individuals of those with 30 million US dollars in net worth (Wealth-X, 2018). Billionaires is a narrower, more refined and more accurate barometer of the truly super-rich. While there are 255,810 individuals across the world with net worth of $30 million or more, there are less than 2,000 billionaires in the entire world. Their ranks include the likes of Bill Gates, Jeff Bezos, Michael Bloomberg, Carlos Slim and the Waltons. The world's 1,826 billionaires make up just 0.00003 percent of the world's population, a

significantly smaller share than the so-called 1 percent, but they hold an incredible amount of wealth. With a combined wealth of more than $7 trillion in 2015, equivalent to nearly 10 percent of the total global economic output (GDP).

Our research uses detailed data from Forbes (Forbes, 2015) on the world's billionaires to examine the geography of the super-rich across the world's cities and metro areas. We map the major industries and sectors that define the super-rich across these global metros, based on the information about their primary residential metropolitan location. We structure our research around five key hypotheses, examine the role of city and metro size, economic living standards, economic competitiveness, industry structure and amenities and quality of life in the location of billionaires across global cities and metro areas.

Our statistical analysis finds that the location of the super-rich is generally most closely associated with the size of metros. Living standards play a more modest role in location, with the presence of finance and tech industries and competitiveness having weaker associations with the location of the super-rich. We find little effect for quality of life and this effect is often negative. We conclude that the location of the super-rich is primarily related to the size of global metros. This is in line with global city theory which notes the high levels of concentration of corporate headquarters, finance, media, and other economic assets in larger, more global cities. That said, our more descriptive analysis of the overall pattern and of industry-specific patterns in the location of the global billionaires finds that the super-rich are not just located in global super-star cities but in many instances can be found in smaller places. Here, we note that the distribution of the super-rich can be, and often is, tied to the industries, corporations and locations where their wealth was originally generated.

Building on the literature on the connection between the super-rich and wealth inequality (see Piketty 2015, Freeland, 2012; Hardoon, 2015; West, 2014; Beaverstock and Hay, 2016; Oxfam International, 2017), we examine the connection between the super-rich and two measures of wealth inequality across global cities. Here, we find staggeringly large divides between super-rich wealth and the economic status of that of the average person across global cities and metro areas

The rest of this paper is organized as follows. The next section outlines the main theory and hypotheses. The third section then discusses the data, variables, and methods used in our analysis. The following sections present the key findings of our descriptive, mapping, and statistical analyses. We summarize our main findings and discuss some of their implications in the concluding section.

Theory and Hypotheses

Our research is structured around five core hypotheses developed in light of theory and research on global cities. The first and most basic one is that we expect that billionaires to be located in larger cities and metropolitan areas. Larger metros have more people, bigger markets, more talent or human capital, a more diverse set of industries and inputs, and more competition, all of which are likely to both produce and attract more of the super-rich (Florida, 2002; Glaeser, Kolko and Saiz, 2001; Gyourko, Mayer, and Sinai, 2006). We also know that the geographic structure of the global economy has become more concentrated, skewed and spiky with the largest cities and metros attracting a larger share of talent and advanced industries (Florida, 2005; Florida, Gulden and Mellander, 2008).

This hypothesis is also framed in light of the broad literature on global cities with identify a small relatively small group of alpha global cities which sit at the apex of the global economy (Sassen, 1991, 2000; Beaverstock et al., 1999, 2000; Taylor, 2001; Beaverstock et al., 2017). These alpha cities house disproportionate concentrations of globally-oriented economic functions like high-level finance and banking, legal services, accounting, marketing, and advertising. There are specific types of alpha cities; New York and London are "alpha ++" cities. There are seven cities in the "alpha +" category: Singapore, Hong Kong, Paris, Beijing, Tokyo, Dubai, and Shanghai. The next group of "alpha cities" includes 19 metros including Sydney, Chicago, Moscow, and Los Angeles. The fourth and final group, "alpha –" cities, includes another 21 metros. We would expect the super-rich to cluster in alpha cities, especially the first three categories of them. Related research notes that alpha cities are defined by so-called "alpha clusters," which include high finance and investment banking; certain high-tech or knowledge based industries; and the creative industries of media, entertainment, advertising, film, and television (Schoales, 2006) which are also disproportionately concentrated geographically in a relatively small set of global cities. These are the kinds of industry that we would expect to generate large numbers of billionaires.

Burrows et al. (2016, 2017) examine the location of the super-rich or what he refers to as "new wealth elites" over long period of time in prestigious areas, the so-called "Alpha Territory" of London. Billionaires do not locate randomly or spread out across cities but seek out prestigious neighborhoods within cities in which to locate. These neighborhoods tend to be long term locations of the super-rich which both persist over time and segregate these new wealth elites from the broader population.

The second hypothesis is that the location of the super-rich will be associated with metros with higher average economic conditions or living standards proxied by

gross regional product per capita. Here, we expect that it is not just overall size, but living standards as well, that will affect the location of the super-rich. Metros with a large middle class will generate greater demand for the kinds of industries and companies that produce billionaires. Metros with higher living standards would also benefit from better educational institutions that would produce talent and lead to more advanced tastes and preferences. Of course, the location of the super-rich does not always follow size and living standards. Smaller places like Omaha or Jackson Hole or Bentonville Arkansas have relatively large locations of the super-rich. Then super-rich are not always mobile. Sometimes they stay in smaller places where they were born or where they generated their wealth, at least in terms of their primary residential locations.

The third hypothesis is that the location of the super-rich will be associated with certain kinds of industry and industry structures. Freund and Oliver (2016) identify the rise in the super-rich over the past two decades as being associated with the increasing returns to two industries in particular: finance and high-tech. We would thus expect metros with larger concentrations of these two industries to be home to larger numbers of billionaires.

The fourth hypothesis is that the location of the super-rich will be associated with more economically competitive cities and metro areas. A wide body of literature suggests that higher levels of economic growth and development are closely associated with competitiveness, defined as honest and transparent government, high quality educational institutions and infrastructure, reasonable tax regimes, effective government provision of services and other related factors.

The fifth hypothesis is that the location and geography of the super-rich will be associated with higher quality, higher amenity, and more livable places. A large and growing body of literature (Albouy, 2009; Glaeser et al., 2001; Lloyd and Clark, 2001)

notes the preference of the skilled and the affluent for higher amenity as well as higher productivity locations. The super-rich are highly mobile and can afford to live in beautiful places that offer high quality of life. Even smaller places with limited industry like Monaco, Jackson Hole, or Palm Beach are noted locations for the super-wealthy. We would thus expect to see some fraction of the super-rich drawn to such high-amenity, high quality of life places (Boschma, 2004; Maskell and Malmberg, 1999; Porter, 1998, 2008). Indeed, while the super-rich can afford to live in the most beautiful places in the world, not all of them do so. Their locations are often sticky and tied to where they generate or have generated their wealth (Hay and Muller, 2012; Young, 2017).

Data, Variables, and Methodology

We base the analysis on data from Forbes' Billionaires List for 2015 (Forbes, 2015). It covers 1,826 billionaires globally and includes information on a number of factors such as their net worth, country of origin, citizenship, location of primary residence, age, marital status, industry, if their fortunes are inherited or self-made, and how their fortunes are trending over time. One caveat: only billionaires whose money was accumulated through legal means are included in the Forbes data; those whose fortunes are tied to corruption, drugs, or other similar illegal activity are excluded from the list.

Forbes provides information about primary residence and we matched the billionaires to global cities or metropolitan areas based on this. To do so, we use the global metro definitions identified by Brookings Institution for the world's 300 largest metros (Brookings, 2014) including their primary cities and surrounding suburbs. If the city of primary residence falls within a Brookings metro, it is assigned to that metro. If it falls outside any known metro boundary, it is kept as the initial city of residence.

We ultimately match 99 percent (1,809 of 1,826) of the billionaires to metros. We were unable to match 17 of them to a specific location. These 17 billionaires account for one percent of total billionaire wealth or $67.7 billion dollars. Three reside in France, two in Finland, and one each in Germany, Italy, Switzerland, and the Philippines. We could not definitively identify countries of residence for eight others, although their citizenship is German. Ultimately, we matched and mapped these 1,809 billionaires across 395 metros or regions. We chart the geography of the global super-rich by their number and by their total wealth. We also chart the geography of the global super-rich by major industry sector.

Several studies use the Forbes data to examine various dimensions of the world's billionaires. Forbes includes the net value of the individuals' assets, including private companies, cash, and account for debt, as well as the values of possessions yachts and art. Forbes uses more than 50 reporters across 16 countries to compile and verify their data on the wealth of billionaires. While the data may not be exact, it is the best available estimation of the current wealth of billionaires across the world. Freund and Oliver used the Forbes data over two decades to chart billionaire trends across nations and industries (but not across cities or metros), identifying the substantial increase in billionaires in the United States and emerging economies, the growth of billionaires in specific industries, notably finance and tech, and the rise of self-made billionaires in the United States and Europe compared to the inherited wealth in Europe (Freund, 2016; Freund and Oliver, 2016). Piketty (2014) used the Forbes data along with data from many other sources to chart the increase in wealth inequality across nations. Kaplan and Rauh (2013) use the Forbes data for various years from 1987 to 2011 to compare U.S. billionaires to billionaires across the rest of the world, examining the sources of their wealth across industry and whether that wealth is self-made as opposed to inherited. They find that the

rise of American billionaires uniquely reflects the rise of high tech industry, the broader shift toward skills-biased technological change, and the super-profits derived by tech superstars like Apple, Microsoft, Google and others. Bagchi and Svejnar (2015) use the Forbes data to look at the effects of two types of billionaire wealth on national economic growth – wealth that is politically-connected and wealth that is unconnected from politics. They find that unconnected wealth is not associated with economic growth while politically-connected wealth is negatively associated with economic growth. Other studies have used the Forbes data to chart the rise in billionaires in other nations and parts of the world: Gandhi and Walton (2012) for India and Guriev and Rachinsky (2005) on the role of oligarchs in Russia's transition to capitalism.

Other sources track the location of global household wealth or high-net-worth individuals. These are broader categories of wealthy people, for example, with net worth in excess of $30 million dollars (Credit Suisse, 2018; Wealth-X, 2018; Capgemini, 2018; Knight Frank, 2018). Beaverstock and Hay (2016) use earlier versions of these data to track the locations of wealth individuals and households. Here we focus on a more refined and narrower segment of the super-rich, billionaires. Others do make use of the Forbes data to identify the location of billionaires across nations and cities (see e.g. UBS, 2018). But these reports simply provide a descriptive reporting of the major locations of the super-rich. The objective of our research is to go beyond such descriptive reporting and to identify the factors and characteristics of cities that are associated with the geography of the super-rich.

To get at this, and to better understand the factors that are associated with the location of the global-super-rich, we conduct both a bivariate correlation analysis and a regression analysis. The variables we use in the statistical analysis area as follows:

Dependent Variables

Billionaires: We employ two alternative measures for billionaires by metro:

- *Number of Billionaires:* This is the number of billionaires per metro.

- *Billionaire Wealth:* reflects the total wealth held by billionaires in that metro.

Independent Variables

We employ the following independent variables in our analysis:

Size: We use two measures for size: *Population Size,* based on population and *Economic Size,* based on economic output to capture the overall size and market size of the metro area. *Population Size* is total metro population in 2014 as per the Brookings Metro Monitor report (Brookings, 2014). *Economic Size* is total metro economic output, also from Brookings (2014). We matched both size variables for 182 metros with billionaires.

Economic Living Standards: We use economic output per capita to capture the living standards of metro populations. The data is for 2014 and comes from Brookings (Brookings, 2014). We matched this data for 182 metros as well.

Tech: Freund and Oliver (2016) show the rise in billionaires to be related to high-tech industry. We use venture capital investments (expressed in millions of US dollars) in high-tech startups to reflect that rise. The variable is from Florida and King (2016), based on data from Thompson Reuters. We matched it for 124 metros.

Finance: Freund and Oliver (2016) also show the rise in billionaires to be related to the finance industry. We measure this via the Global Financial Centres Index developed by the Z/Yen Group for the year 2015 (Yeandle and Mainelli, 2015). This index includes measures related to the financial power of global cities including their overall business environment, financial sector development, financial infrastructure, talent base, and reputation. We matched this data for 58 metros.

City Competitiveness: We use a measure from The Economist Intelligence Unit and Citigroup (Economist Intelligence Unit, 2013) which includes indicators of economic strength, physical capital, financial maturity, institutional character, human capital, global appeal, social and cultural character, and environment and natural hazards. We matched these data for 87 metros.

Quality of Life: There is a considerable literature that suggests that more affluent people are drawn to locations that offer a higher quality of life and more amenities, which are in turn reflected in higher housing prices (Albouy, 2009, 2015; Glaeser, Kolko and Saiz, 2001; Roback, 1982). We include a measure of the Quality of Life variable to capture this. The Quality of Life variable is based on the Economist Intelligence Unit's Livability Index (Economist Intelligence Unit, 2012) which includes data on political stability, healthcare, culture and environment, education and infrastructure. We matched this data to 85 metros.

Table 1 lists the descriptive statistics for all the variables used in the analysis.

(Table 1 about here)

In the correlation and regression analysis, we only include metros where billionaires are actually present, and thus exclude metros with no billionaires. Due to the skewed distribution, we log the following explanatory variables: the Number of Billionaires and Billionaire Wealth as well as Population Size, Economic Size, and Tech.

In light of our theory and hypotheses, the regression analysis considers the location of the super-rich (both Billionaires and Billionaire Wealth) as a function of Size measured both as Population Size and Economic Size, and several other factors or metro qualities including: Living Standards, Industry Structure (especially Finance and Tech),

City Competitiveness, and Quality of Life. We use a standard OLS estimation technique to estimate the equation. Our basic model is as follows:

$$\ln \text{Billionaires}_r$$

$$= \alpha + \beta_1 \ln \text{Size}_r + \beta_2 \text{Economic Living Standards}_r$$

$$+ \beta_3 \text{Industry Structure}_r + +\beta_3 \Sigma \text{Quality of Life}_r + \varepsilon$$

where Billionaires is represented either by the number of billionaires or their total metro wealth. It is important to note that data limitations lead to missing observations for several key variables. When we include all variables in the model, we end up with matching data for just 40 metros. To deal with this, we include one variable at a time in the regression analysis, controlling for market size. We also repeat the regressions, replacing the missing observations with mean values.

Findings

We now turn to the findings of our analysis. We begin with basic descriptive data and maps that provide an overview of the global location of the super-rich, then turn to the findings of the statistical analysis.

The Super-Rich across Global Cities and Metros

We start with the locations of the super-rich across the world's cities and metro areas.

(Figure 1 about here)

Figure 1 maps the number of billionaires by metro. New York tops the list with 116 billionaires or 6.4 percent of the world's billionaires. The San Francisco Bay Area is second with 71 (3.9 percent), Moscow third with 68 (3.7 percent), and Hong Kong fourth

with 65 (3.5 percent). Three additional metros have between 2 and 3 percent of the global super-rich: Los Angeles (2.8 percent), London (2.7 percent), and Beijing (2.5 percent). Each remaining city in the top twenty accounts for between 1 and 2 percent of the world's billionaires. Four of the top ten global cities for the super-rich and six of the top twenty are in the United States. All of the top ten cities and 18 of the top twenty are global alpha cities.

We now chart the total wealth held by the super-rich across the cities and metros of the world (see Figure 2).

(Figure 2 about here)

New York again tops the list with $537 billion or 7.6 percent of all global billionaire wealth. San Francisco is second with $365 billion or 5.2 percent; Moscow third with $290 billion or 4.1 percent; Hong Kong fourth with $274 billion or 3.9 percent; and London is fifth with $213 billion or 3.0 percent. Los Angeles ($175 billion, 2.5 percent), Beijing ($171 billion, 2.4 percent), Paris ($167 billion, 2.4 percent), Seattle ($164 billion, 2.3 percent), and Dallas ($156 billion, 2.2 percent) complete the top ten. The United States has five metros in the top ten and 9 in the top twenty on this metric. Here, 8 of the top 10 and 14 of the top twenty cities for the location of the super-rich are global alpha cities. However, we also find Bentonville, Omaha, La Coruña and Jackson, WY among the top 20 metros. It may seem surprising that Beijing ranks higher as a super-rich location than Shanghai, a enter of industry and commerce that has experienced a remarkable rate of growth. But Beijing remains the political capital of the country and is the seat of the Communist Party government. In its a state-controlled economy, it is rational for the super-rich to locate close to the seat of political power. Many of the Chinese billionaires are also members of the Communist Party and the nation's

Parliament, indicative to the close links between wealth and political power in China (see, Wee, 2018).

Table 2 shows the concentration of the super-rich across the world's cities and metro areas.

(Table 2 about here)

The top ten metros account for nearly a third (30.7 percent) of the world's super-rich, while making up just 1.8 percent of the world's population. The top twenty account for more than 40 percent (43.5 percent), while making up just 3.5 percent of the world's population. The top fifty metros account for nearly two-thirds (63.6 percent) of the world's billionaires, while making up just 7 percent (7.2) percent of the world's population.

The wealth of the super-rich is even more concentrated than their numbers. The top ten metros control $2.5 trillion dollars, more than the total GDP of Brazil, Italy, or India. The top twenty metros account for $3.4 trillion, equivalent to the GDP of Germany, the world's fourth largest economy. And the top fifty account for almost $5 trillion, equivalent to the world's third largest economy, after the United States and China, and accounting for more than 70 percent of all billionaire wealth. Ultimately, the number of billionaires and their total wealth is closely associated across global metros, with a correlation of 0.87. Super-rich wealth is also overwhelmingly concentrated in global alpha cities in line with the literature on global cities. The 49 alpha cities which account for 7 percent of the world's population and 5 percent of global economic output account for 57 percent of super-rich wealth.

Empirical Analysis

Now that we have covered our descriptive analysis and mapping of the geography of the super-rich, we turn to our statistical analysis. We begin with the findings of the correlation analysis before turning to the results of the regression models.

Correlation Analysis

In light of our five key hypotheses, we examine the correlations between both the number of billionaires and their total wealth, and the following key variables: Population Size, Economic Size, Living Standards (measured as economic output per capita), Tech (measured as venture capital investment in high-tech startups), Finance (via the Global Financial Centre Index) Competitiveness, and Quality of Life. The table below summarizes the results (see Table 3):

(Table 3 about here)

The correlations for both billionaire variables – the number and wealth of billionaires – are very similar in terms of both strength and significance. This is not surprising given that these two variables are highly correlated, at 0.917.

Size: Recall that we hypothesize the location of the super-rich to be a function of the market size and opportunities offered by larger metros. The correlations for Economic Size are the highest of any in our analysis, 0.684 for Billionaires and 0.610 for Billionaire Wealth. The correlations for Population Size are also relatively high (0.559 for Billionaires and 0.438 for Billionaire Wealth). It is important to note that these correlations do not imply causality, but only point to an association between these variables. It may be that billionaires are more likely to emerge in larger economies, and it may be that their activities make those economies larger. It is more likely, however, that both are going on to some degree.

Economic Living Standards: We also hypothesize that the location of the super-rich would not only follow the size of metros but also their overall living standards. To get at this, we look at the connection between the super-rich and economic output per capita, a straightforward indicator of the average wealth per person. Surprisingly, there is no statistically significant association at all between Living Standards and Billionaires, and only a very weak association between it and Billionaire Wealth (0.146). This may reflect the fact that there are many large but relatively poor metros with low Living Standards such as Mumbai, Bangalore, Kolkata, and Hyderabad, which are home to quite a few billionaires. It is also worth noting that there are also relatively affluent cities that have relatively fewer billionaires.

Tech: Following Freund and Oliver (2016), we further hypothesize a connection between the tech industry and the location of global super-rich. Recall that our proxy for high-tech startups is venture capital investment flowing to high-tech startups in metro areas. We find a positive association between Tech and both Billionaires (0.435) and Billionaire Wealth (0.455).

Finance: Following Philippon (2008) and Freund and Oliver (2016), we hypothesize a connection between finance and the location of the super-rich and metros, which are global banking and financial centers. To get at this, we utilize the Global Financial Centres Index, a measure of the financial power of global cities. We find Finance to be closely correlated with both Billionaires (0.490) and Billionaire Wealth (0.517).

Competitiveness: We would also expect the global super-rich to be more highly clustered in more competitive cities with better business climates, better infrastructure, and lower taxes. To search for this correlation, we utilize a relatively well-known measure of economic competitiveness developed by the Economist Intelligence Unit

(2013) as described above. Both Billionaires (0.473) and Billionaire Wealth (0.514) are associated with this measure of City Competitiveness.

Quality of Life: We also hypothesize that billionaires are more likely to be found in global cities and metros that offer higher amenities and quality of life. To get at this, we employ a Quality of Life Index developed by The Economist Intelligence Unit (2012), also described above. This variable is not significantly related to either Billionaires or Billionaire Wealth.

In sum, our analysis suggests that the geographic distribution of billionaires follows mainly from the size of global metros, measured by population, and even more so by economic output. It is also related to their finance and tech industries (proxied by venture capital investment) and competitiveness, but less so by living standards and not at all by quality of life.

Regression Analysis

We now turn to the results of the regression analysis to test our five key hypotheses regarding the role of metro size, living standards, finance and tech industry, city competitiveness and quality of life in the location and geography of the super-rich. Table 5 summarizes the results of the regression model: Part A is the original estimation with the actual number of observations and Part B is estimation with missing observations replaced by means.

(Table 4 about here)

We begin by looking at the effects of Size alone. Equation 1 examines the location of billionaires in light of two variables: Economic Size and Population Size. Economic Size is positive and significant, while Population Size is insignificant. (Part A and Part B are the same since these regressions include all 182 observations).

We now turn to a regression including Living Standards in combination with Size. Equation 2 combines Living Standards with Economic Size, while Equation 3 replaces Economic Size with Population Size. The Size variables are positive and significant in each model. Living Standards is positive and significant alongside Population Size, but insignificant alongside Economic Size.

It is worth noting that Economic Size generates roughly the same R2 Adjusted value as Population Size and Living Standards together, explaining approximately 46 percent of the variation of the location of billionaires across global metros. Thus, the following regressions (Equations 4 through 8) include Economic Size and discard Population Size and Living Standards.

We now examine the role of Tech. Recall our hypothesis that the location of the super-rich is related to the rise in tech wealth. Equation 4 adds Tech alongside Economic Size. Both variables are positive and significant. This model includes 124 observations and the results are similar when we replace the missing values with means.

Equation 5 adds Finance, alongside Economic Size. Recall our hypothesis that the location of the super-rich will be shaped in part by the rise in finance billionaires. We add Finance to the model alongside Economic Size and Tech. Finance is insignificant in both versions of the regression with actual observations (n=43) and using means to replace these missing values. Economic Size remains significant in both versions of the model and Tech, which is insignificant in the model with actual observations (Part A), becomes significant in the model with mean values replacing the missing observations (Part B).

Recall we hypothesized that more competitive metros would be home to more billionaires. Equation 6 adds City Competitiveness, alongside Economic Size and Tech.

City Competitiveness is insignificant in both versions of the model with actual observations (n=65) and when the missing observations are replaced with mean values. Economic Size is positive and significant in both versions of the model and Tech, which is insignificant in the model with actual observations (Part A), turns significant in the regression where missing observations are replaced by mean values (Part B).

Recall our hypothesis that the super-rich will prefer high amenity cities that offer greater livability and quality of life. Equation 7 adds Quality of Life alongside Economic Size and Tech. Quality of Life is insignificant in both versions of the model, based on actual observations (n=63) and when we replace missing observations with mean values. Economic Size remains positive and significant in both versions. Tech is again insignificant with actual observations (Part A), but significant in the model where we replace missing observations with means replacing the missing observations (Part B).

Equation 8 includes all the variables. We end up with a reduced number of observations (n=40), and no variables are significant (Part A) save for Quality of Life which is negative and significant. However, when we extend the sample by replacing missing observations with mean values (Part B), Economic Size, Living Standards, Tech, Finance, and City Competitiveness all turn significant and positive, while Quality of Life remains negative and significant. This version of the model generates an Adjusted R2 of 0.518.

We also ran the same regressions using Billionaire Wealth as the dependent variable (see the Appendix). The results are similar to those reported above, which is not surprising given the close correlation between the numbers of billionaires and billionaire wealth across metros, noted above. In general, the R2 Adjusted values are somewhat lower for the regressions using Billionaire Wealth as the dependent variable. Economic

Size remains closely associated with Billionaire Wealth. Tech is relatively stronger in some cases, going from a 5 percent to a 1 percent significance level in Equations 4B and 5B. However, the overall results remain the same, with a strong association to Economic Size, more modest positive associations to Living Standards and Tech, and weaker positive associations with Finance and City Competitiveness. Quality of Life is either insignificant or negative and significant.

The results from these models inform a number of key conclusions. The location of the super-rich (measured either as a number or by their wealth) appears to be by far most strongly associated with economic and population size. This confirms our hypothesis that the location of the super-rich is related to metro size, including, but not limited to, market size, industry diversity, and opportunities associated with larger metro areas. There are a number of other factors that are associated with the location of the super-rich, though their effects are considerably weaker than size. The location of the super-rich is more modestly associated with living standards. This confirms our hypothesis that metros where the living standards of the population are higher will have more billionaires. When it comes to industry sectors, the location of the super-rich is more closely associated with the high-tech industry than with the finance and banking sector. This stands in contrast to previous research that identified finance as the leading cause of the recent growth in the super-rich (See Freund and Oliver, 2016). But this may simply also reflect the fact that the Tech variable is a better measure than Finance and covers more metro areas.

The location of the super-rich is only weakly associated with the competitiveness of global cities and metro areas. This may reflect the fact that many of the locations with large levels of the super-rich like New York, San Francisco, and London, not to mention northern European and Scandinavian metros, have high rates of taxation and high costs

of business. Surprisingly, given theory and research on the role of quality of life in attracting the talented and the affluent, and our expectation that highly mobile billionaires might prefer nicer places to live, the location of billionaires is either insignificant or negatively related to quality of life. We have reason to believe that there may be two things going on here. The first is that our variables for size may be capturing some of the effects that derive from quality of life (more amenities, higher quality housing that are available in larger cities and metros) and also from industry structures, especially finance and tech industries, which are closely associated with larger superstar cities like New York, London, and Tokyo. That said, relatively low variance inflation factor scores (around 1) indicate that there is no multicollinearity issue when Quality of Life and Economic Size are combined in the same model. The second is a broader caveat that has to do with the small number of observations and the potentially lower quality of some of these measures due to limited survey data. Ultimately, the location of the super-rich across global metros appears to be largely a function of the size of metro areas, with other variables like living standards and industry structure, particularly tech, playing a more limited role.

The Super-Rich by Industry

Now that we have looked at the overall geography of the super-rich, initially by mapping their locations across global cities and then via our statistical analysis, we now look at more nuanced and varied patterns in their location across key industries. Here, we look in detail at three of those industries: fashion and retail; technology and telecom; and business, finance, and investment.

One might think of finance or high-tech as leading sources of wealth, but fashion and retail tops the list with over $1 trillion in billionaire wealth, more than 15.6 percent

of total billionaire wealth. This sector includes billionaires associated with companies like Wal-Mart, H&M, Nike, L'Oréal, and Chanel. High tech, or more precisely technology and telecom is second, with $989 billion, 14 percent of the total. Business, finance and investment is third with $962 billion, (13.6 percent). Resources is fourth with $623 billion (8.8 percent) and Automotive and manufacturing is fifth, with $561 billion (7.7 percent). The top five industries account for 60 percent of all global billionaires.

The following maps dive deeper into how billionaires break out across the three leading industries for billionaire wealth: Fashion and retail; Technology and telecom; and Business, finance, and investments.

(Figure 3 about here)

Figure 3 maps the geography of billionaire wealth for the fashion and retail industry. There are large dots across the United States and much of Europe, and much smaller dots in Asia, the Middle East, and South America. Paris tops the list. But second on the list is tiny Bentonville, Arkansas, home of Wal-Mart and the Walton family. Milan is third, followed by another small city, Jackson, Wyoming, home to another of the members of the Walton/Wal-Mart family. Dallas follows in fifth; it is also home to one of the members of the Wal-Mart/ Walton family. New York, Tokyo, Hamburg and Dusseldorf round out the top ten. London ranks 15th with seven fashion and retail billionaires worth a combined $18.2 billion dollars.

(Figure 4 about here)

Figure 4 maps the pattern for the technology and telecom industry. There are large dots in the United States, especially the West Coast, and Asia, especially China. There are much smaller dots in Europe and the Middle East, and virtually none in South America. Not surprisingly, San Francisco tops the list, followed by Seattle home to

Microsoft, Amazon and other leading tech companies. Mexico City is next, the result of one fortune: Carlos Slim, who is ranked second among global billionaires. Beijing is fourth and Tokyo fifth. Here again the smaller city of Karlsruhe, joins the ranks of these cities plus Shenzhen, Hangzhou, Bangalore, and Los Angeles among the top ten.

(Figure 5 about here)
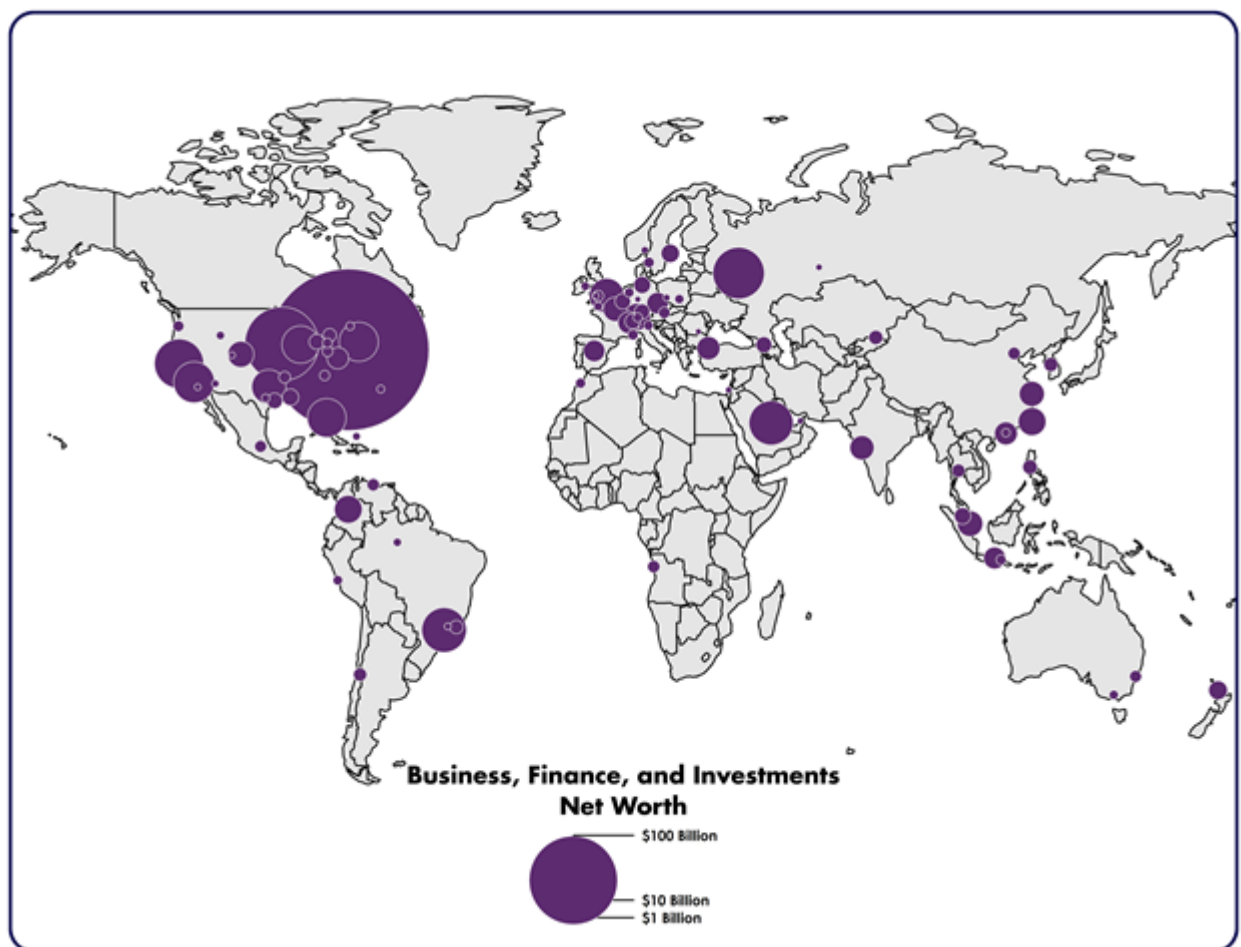
Figure 5: The Geography of Business, Finance, and Investment Billionaires

Figure 5 maps the geography of billionaire wealth in business, finance and investment. There are large dots in the United States, especially on the East Coast, but there are also dots spread across the world from Western Europe and South America to Asia and the Middle East. Unsurprisingly, New York takes the top spot by far. But here again we find a smaller city, Omaha, Nebraska in second: It is home to Warren Buffett.

Moscow is third, followed by the San Francisco Bay Area, a reflection of the high level of venture capital investment there. Sao Paolo, Riyadh, Los Angeles, Boston, Miami (home to a large volume of foreign investment capital especially from Latin America), and Chicago round out the top ten. London ranks 11th and Hong Kong is 22nd. Freund and Oliver (2016) note that finance has played a disproportionate role in the growth of extreme wealth in the United States, pointing out that more 80 percent of all hedge fund billionaires are from the United States. "Over 40 percent of the growth in the total US billionaire population is attributable to growth in financial sector billionaires, as compared with 14 percent in Europe and 12 percent in other advanced economies," according to the report. "Within the US financial industry, hedge funds have played an especially large role in creating extreme wealth. This group made up less than 10 percent of American financial sector wealth in 2000 and 22 percent in 2015." (Freund and Oliver 2016: p. 11).

The Geography of The Super-Rich and Economic Inequality

We now turn to an analysis of the connection between the location of the super-rich and wealth inequality. This connection between the super-rich and wealth inequality has been the focus of considerable attention in the literature (see Piketty 2014, Freeland, 2012; Hardoon, 2015; West, 2014; Oxfam International, 2017), but there fewer studies have focussed on how this connection varies by city or location. We use two measures to get at this connection: the ratio of super-rich wealth to the entire economic output (GRP) of metros and the ratio of super-rich wealth to average economic output (GRP) per person. Neither measure is perfect, both have their limits or flaws (e.g. that GRP is a yearly measure while billionaires' wealth can stretch over generations), but they capture aspects of the extraordinary inequality that is a feature of such hughly concentrated super-rich wealth. We begin with our ratio measure which compares the

level of billionaire wealth to the economic output (GRP) of metros. Figure 6 maps this for the metros which are home to ten or more billionaires.

(Figure 6 about here)

Across the world, the fortunes of the super-rich are equivalent to a significant portion of the total economic output of the entire cities and metro areas in which they reside. The wealth of the super-rich in London or Sao Paolo is equivalent to about a quarter of the metros' annual economic output. In Mexico City and Beijing it is equivalent to about a third of annual economic output. In New York and Stockholm, it is about 40 percent, and in Seattle it is around 60 percent. In Hong Kong it is 70 percent and in San Francisco roughly three-quarters. In Mumbai it is 90 percent, and in Geneva, a smaller city, the fortunes of the super-rich are equivalent to more than 150 percent of annual economic output.

Our next measure examines the ratio of billionaire wealth to economic output (GRP) per person by metro. Figure 7 shows this ratio for the metros which again are home to ten or more billionaires.

(Figure 7 about here)

The magnitude of the gap is staggering, with the fortunes of the super-rich ranging from 100,000 to more than 600,000 times greater than the average GRP per capita in the 20 metros with the largest overall wealth gaps. Most of these cities are in the relatively less developed nations of the Global South, where the middle class is much smaller, poverty is substantially greater, and average incomes are much lower than in the advanced economies. In fact, 14 of these 20 cities are in the Global South. Bangalore tops the list, followed by Mumbai and Mexico City. Manila, Delhi, Rio de Janeiro, Sao Paulo, Bangkok, Hangzhou, Jakarta, Beijing, Santiago, Shanghai, and Dubai all number

among the top 20 cities with the largest super-rich wealth gaps. Six cities in advanced nations number among the top 20 as well: Seattle, Dallas, Paris, Stockholm, Toronto, and Tokyo.

Our findings here in line with the broader literature on wealth inequality (e.g. Piketty, 2014; Freeland, 2012; West, 2014; Hardoon, 2015; Oxfam International, 2017), showing the staggering divide between the wealth of billionaires and the economic status of average people in the cities of the world.

Discussion and Conclusions

Our research has examined the location of the super-rich in light of five key hypotheses related to the size, living standards, industry structure, competitiveness and quality of life of global cities and metro areas. We developed unique data on the location of the super-rich based on detailed data from Forbes on more than 1,800 billionaires across the globe, and matched to indicators of population and economic size, living standards (economic output per capita), finance and tech industries, city competitive and quality of life.

Based on our descriptive analysis, we find that the super-rich are concentrated in a small number of metros around the world. The top fifty metros account for nearly two-thirds of the total; the top twenty account for more than 40 percent, and just the top ten account for more than 30 percent. The wealth of the super-rich is even more concentrated than their numbers. The top ten metros are home to 36 percent of total billionaire wealth, the top twenty account for nearly half, and the top fifty hold over 70 percent of billionaire wealth. New York tops the list on billionaire wealth, followed by the San Francisco Bay Area, Moscow, Hong Kong, London, Los Angeles, Beijing, Paris, and Dallas. The

United States has 5 metros in the top ten and 9 in the top twenty metros for billionaire wealth. The super-rich are also disproportionately concentered in global alpha cities which house 57 percent of them while being home to just 7 percent of the world's population. This is in line with the constructs and expectations of the global city literature (Sassen, 1991; Beaverstock et al., 1999, 2000; Taylor, 2001).

Our statistical analysis, particularly the findings from the regression analysis, helps to better clarify the factors that are associated with the location of the super-rich across global cities and metros areas. We estimate these regressions in two ways – based on observed variables and using mean values to replace the large numbers of missing variables for some measures.

Broadly speaking, the main finding from the statistical analysis is that the location of the super-rich is related to the size of metros. As we hypothesized, larger metros have more people, bigger markets, larger and more diverse industries, more talent, more opportunity, a bigger range of housing and more amenities, and a range of other factors that will produce and attract the super-rich. We find modest associations to living standards and tech industry in combination with size, and even more modest associations to finance and city competitiveness. We find no association and at times a negative association between quality of life and the location of the super-rich. As noted above, this may reflect the quality of data and limited number of observations for these measures. That said, we can say with a certain level of confidence that metro size is by far the most important factor in the location and geography of the global super-rich. This is in line with a broader body of literature which shows the increasing returns to metro size (Bettencourt, 2013; Bettencourt, Lobo, Helbing, Kühnert and West, 2007) and which also documents the connection between metro size and inequality (Baum-Snow, Freedman and Pavan, 2014; Baum-Snow and Pavan, 2012).

That said, our examination of more fine-grained industry patterns indicates that the location of the super-rich is varied, idiosyncratic and sticky. For one, we find considerable variation in clusters of the super-rich by industry. Milan, for example, is the largest cluster of super-rich wealth for the fashion and retail, with larger concentrations than New York, London, and Paris. San Francisco tops the list on technology and telecom, followed by Beijing, with Los Angeles, Bangalore, Seoul, Shenzhen, and Seattle, all of which best New York and London. Even though the geography of the super-rich generally speaking follows the size global cities, we find also find clusters of the super-rich in smaller places such as such with the cases the Walton family in Bentonville, Arkansas, Warren Buffet in Omaha, Nebraska, or Zara billionaire Amancio Ortega in La Coruña, Spain. Their locations are can be tied to where they generate or have generated their wealth (Hay and Muller, 2012; Young, 2017), The super-rich are not always mobile, and they do not always head for big, rich, high amenity cities. Indeed, a significant stratum of them remain located in places where their wealth was originally generated. To some extent then, the location of the super-rich can in some cases be said to be "sticky" – tied to the long-established and path dependent niches in the global spatial division that they or their families occupy.

In light of the important literature on the connection between the super-rich and wealth inequality (see Piketty 2015, Freeland, 2012; Hardoon, 2015; West, 2014; Beaverstock and Hay, 2016; Oxfam International, 2017), we also examined the connection between the super-rich and two measures of wealth inequality across global cities – the ratio of super-rich wealth to metropolitan economic output and the ratio of super-rich wealth to economic output per person. We found the extent of the divide between super-rich wealth and the economic status of the average person to be

staggering, ranging between 100,000 to more than 600,000 times greater in the most extreme cases.

Our research contributes to the growing literature on the super-rich (especially Hay and Beaverstock, 2016). We hope that our analysis of geography of the super-rich across the world's cities and metros will stimulate others to look further into geography of the super-rich and its role in advanced capitalism.

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Appendix:

Regression Results for Billionaire Wealth

PART A:	Eq.1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6	Eq. 7	Eq. 8
Economic Size (log)	1.173** (7.240)	1.048** (10.075)		0.914** (6.224)	0.826** (3.452)	0.633** (3.074)	0.964** (4.548)	0.401 (1.557)
Size Population (log)	-0.125 (-0.882)		1.048** (10.048)					
Living Standards (log)		0.125 (0.882)	1.173** (7.240)					
Tech (log)				0.209** (2.736)	0.096 (0.857)	0.157 (1.700)	0.193 (1.983)	0.081 (0.784)
Finance					0.006 (1.808)			0.010* (2.378)
City Competitiveness						0.038* (2.113)		0.040 (0.987)
Quality of Life							-0.017 (-1.397)	-0.061** (-3.191)
R2 Adj	0.367	0.367	0.367	0.378	0.370	0.365	0.420	0.460
N	182	182	182	124	43	65	63	40

Missing observations replaced by mean values

PART B:	Eq.1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6	Eq. 7	Eq. 8
Economic Size (log)	1.173** (7.240)	1.048** (10.075)		0.952** (8.820)	0.912** (8.375)	0.896** (8.034)	0.949** (8.806)	0.818** (7.340)
Size Population (log)	-0.125 (-0.882)		1.048** (10.048)					
Living Standards (log)		0.125 (0.882)	1.173** (7.240)					
Tech (log)				0.200** (2.839)	0.186** (2.641)	0.176* (2.470)	0.209** (2.958)	0.173* (2.489)
Finance					0.006* (2.022)			0.006 (1.842)
City Competitiveness						0.028 (1.857)		0.043* (2.376)
Quality of Life							-0.012 (-1.265)	-0.033** (-2.947)
R2 Adj	0.367	0.367	0.367	0.392	0.402	0.400	0.394	0.428
N	182	182	182	182	182	182	182	182

*indicates significance at the 5 percent level, **at the 1 percent level. t-values within parentheses.

TABLES:

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Billionaires (Number)	182	1	116	8	14
Billionaire Wealth (Billions of dollars)	182	1	537	32	64
Population Size	182	609,470	37,027,800	5,997,809	6,284,816
Economic Size (Millions of dollars)	182	32,014	1,616,792	190,522	210,995
Living Standards	182	4,036	83,088	39,447	18,079
Tech (Millions of dollars)	124	5	6,471	244	690
Finance	58	536	786	666	53
City Competitiveness	87	38	76	55	9
Quality of Life	85	53	98	83	13

Table 2: The Geographic Concentration of the Global Super-Rich

	Top 10 Metros	Top 20 Metros	Top 50 Metros
Number of Billionaires:			
Number	560	795	1,152
Share	30.7%	43.5%	63.1%
Wealth (billions)	$2,307	$3,183	$4,710
Share	32.7%	45.1%	66.8%
Share of World Population	1.8%	3.5%	7.2%
Billionaire Wealth			
Number	527	687	1,096
Share	28.8%	37.6%	60.0%
Wealth (billions)	$2,511	$3,437	$4,983
Share	35.6%	48.7%	70.6%
Share of World Population	1.6%	3.5%	6.9%

Table 3: Correlation Analysis

	Number of Billionaires	Billionaire Wealth
Billionaires	-	0.917**
Billionaire Wealth	0.917**	-
Population Size	.559**	.438**
Economic Size	.684**	.610**
Living Standards	.059	.146*
Tech	.435**	.440**
Finance	.490**	.517**
Competitiveness	.473**	.514**
Quality of Life	-.130	-.072

*indicates significance at the 5 percent level, **at the 1 percent level.

Table 4: Regression Results for Number of Billionaires

PART A:	Eq.1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6	Eq. 7	Eq. 8
Economic Size (log)	0.881**	0.974**		0.906**	0.750**	0.667**	0.875**	0.440*
	(7.315)	(12.586)		(8.285)	(3.858)	(3.973)	(5.252)	(2.126)
Population Size (log)	0.092		0.974**					
	(0.879)		(12.586)					
Living Standards (log)		-0.092	0.881**					
		(-0.092)	(7.315)					
Tech (log)				0.126*	0.063	0.091	0.125	0.049
				(0.126)	(0.696)	(1.206)	(1.628)	(0.559)
Finance					0.005			0.009*
					(0.696)			(2.585)
City Competitiveness						0.021		0.025
						(1.388)		(0.760)
Quality of Life							-0.019	-0.052**
							(-1.957)	(-3.377)
R2 Adj	0.464	0.464	0.464	0.473	0.395	0.363	0.420	0.510
N	182	182	182	124	43	65	63	40

Missing observations replaced by mean values

PART B:	Eq.1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6	Eq. 7	Eq. 8
Economic Size (log)	0.881**	0.974**		0.892**	0.865**	0.862**	0.888**	0.792**
	(7.315)	(12.586)		(8.285)	(10.598)	(10.294)	(11.110)	(9.585)
Population Size (log)	0.092		0.974**					
	(0.879)		(12.586)					
Living Standards (log)		-0.092	0.881**					
		(-0.092)	(7.315)					
Tech (log)				0.129*	0.119*	0.116*	0.141**	0.114*
				(0.126)	(2.263)	(2.172)	(2.675)	(2.212)
Finance					0.004			0.005*
					(1.827)			(1.994)
City Competitiveness						0.015		0.030*
						(1.302)		(2.237)
Quality of Life							-0.015*	-0.030**
							(-2.129)	(-3.667)
R2 Adj	0.464	0.480	0.464	0.479	0.492	0.481	0.489	0.518
N	182	182	182	182	182	182	182	182

*indicates significance at the 5 percent level, **at the 1 percent level. t-values within parentheses.
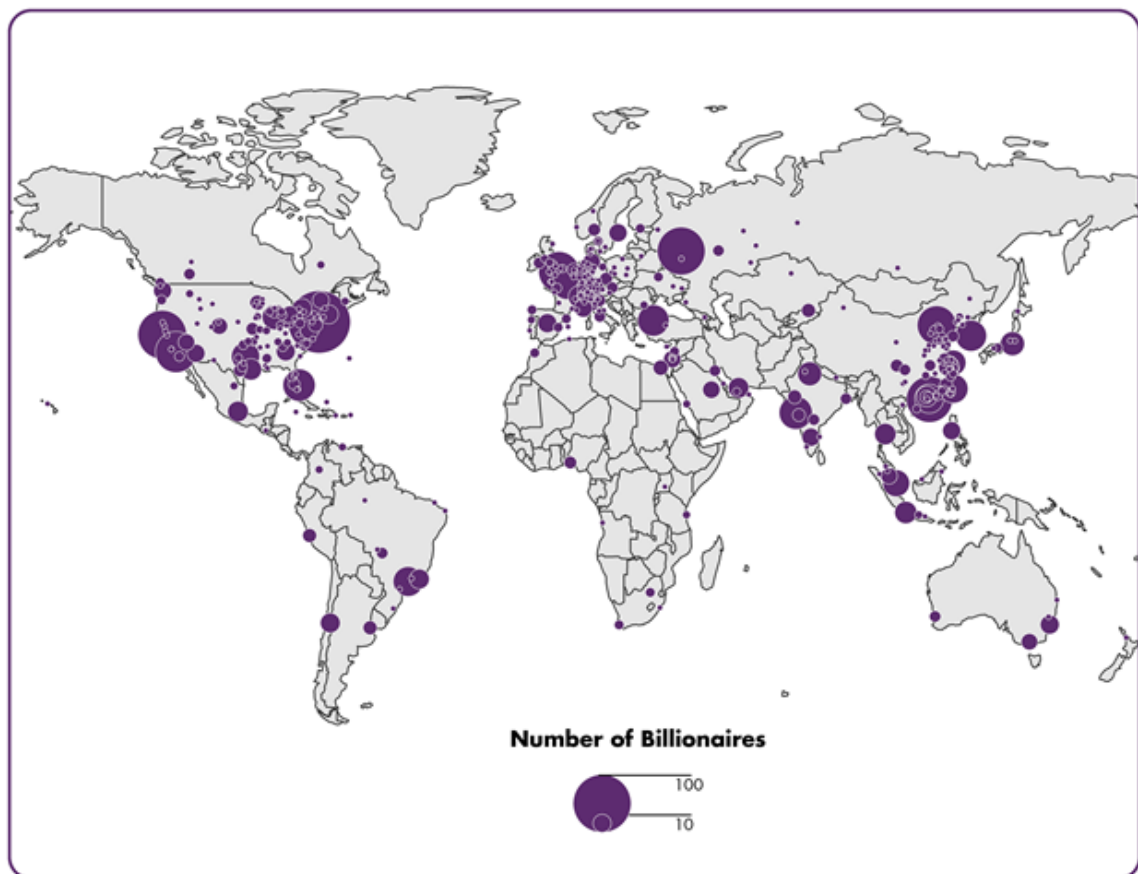
FIGURES:

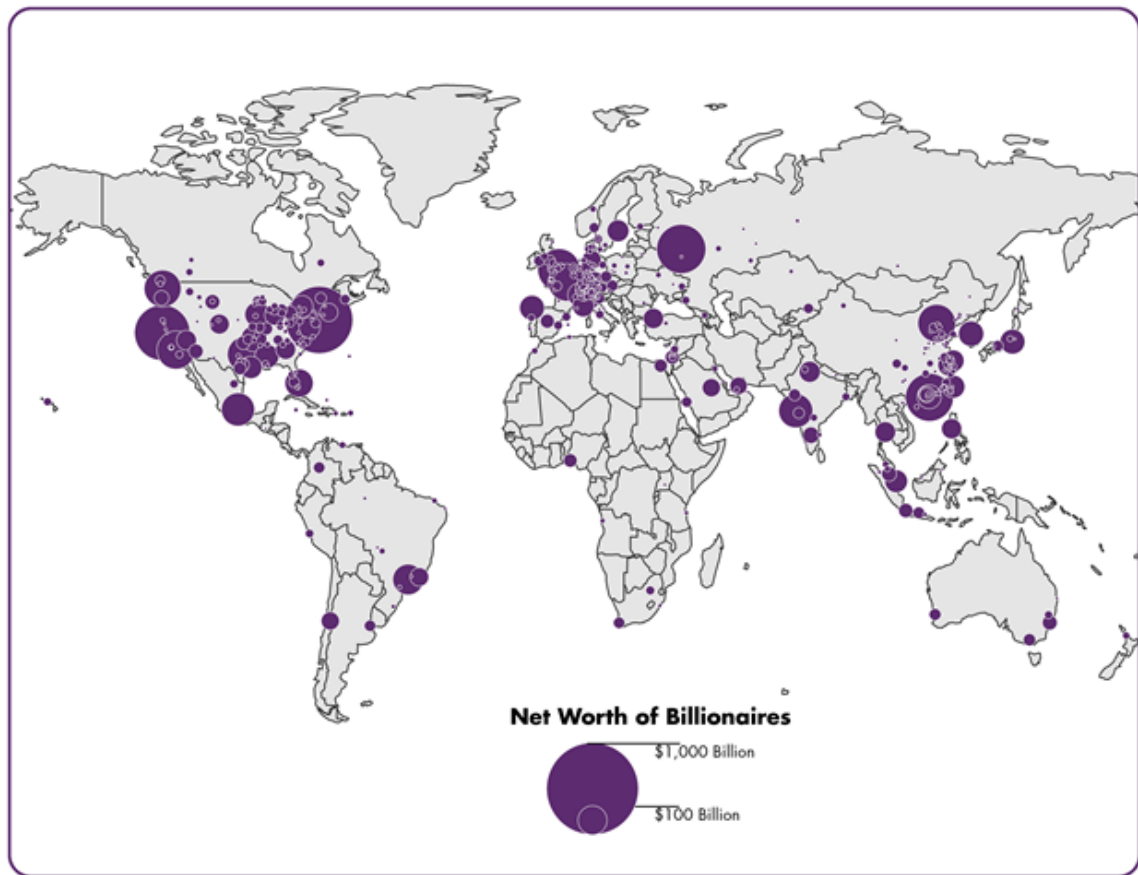**Figure 1: The Global Super-Rich by Major Global City and Metro**

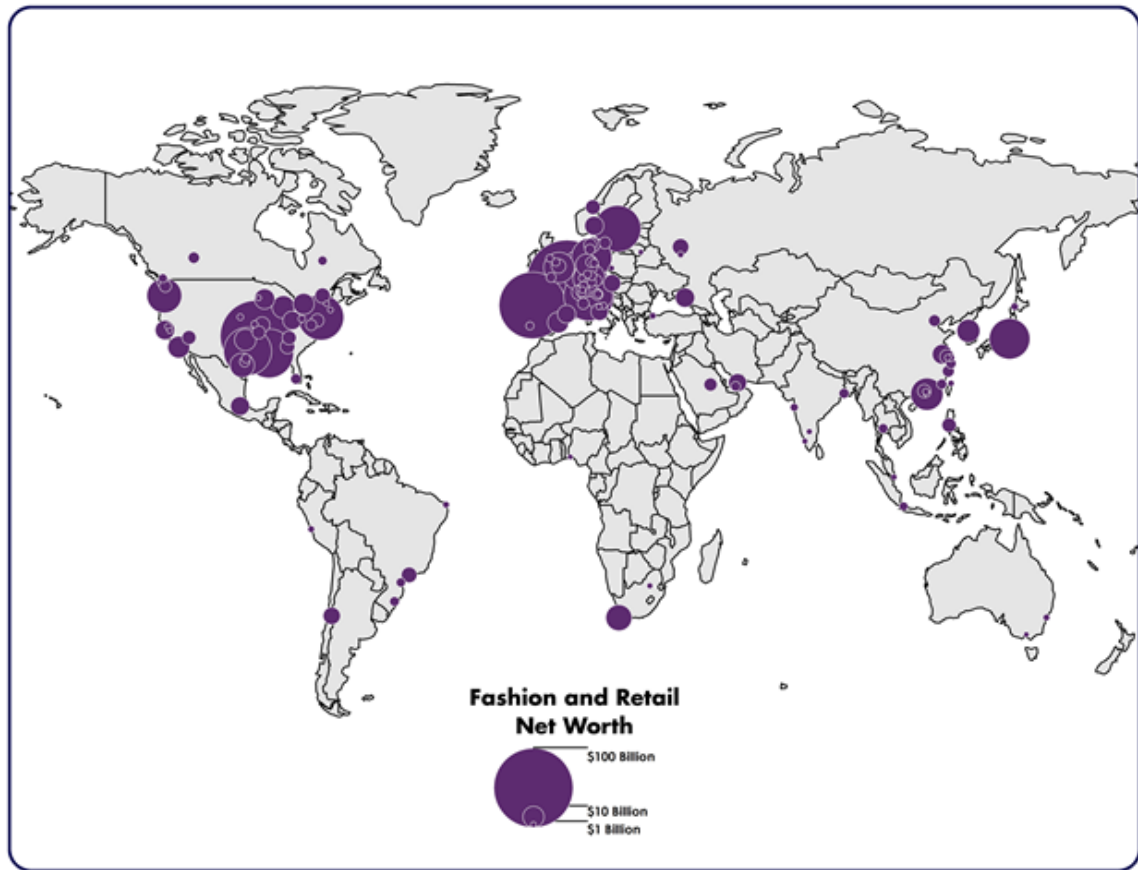**Figure 2: Super-Rich Fortunes by Global City or Metro**

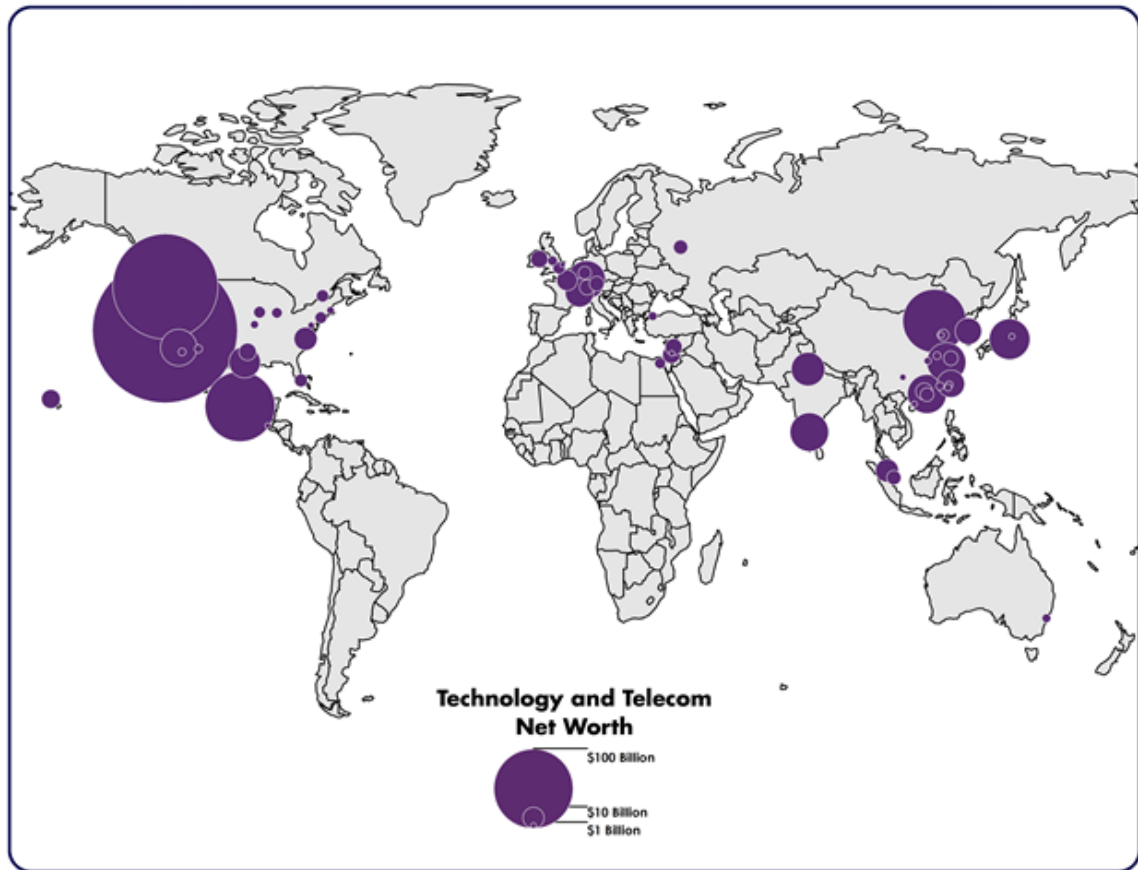**Figure 3: The Geography of Fashion and Retail Billionaires**
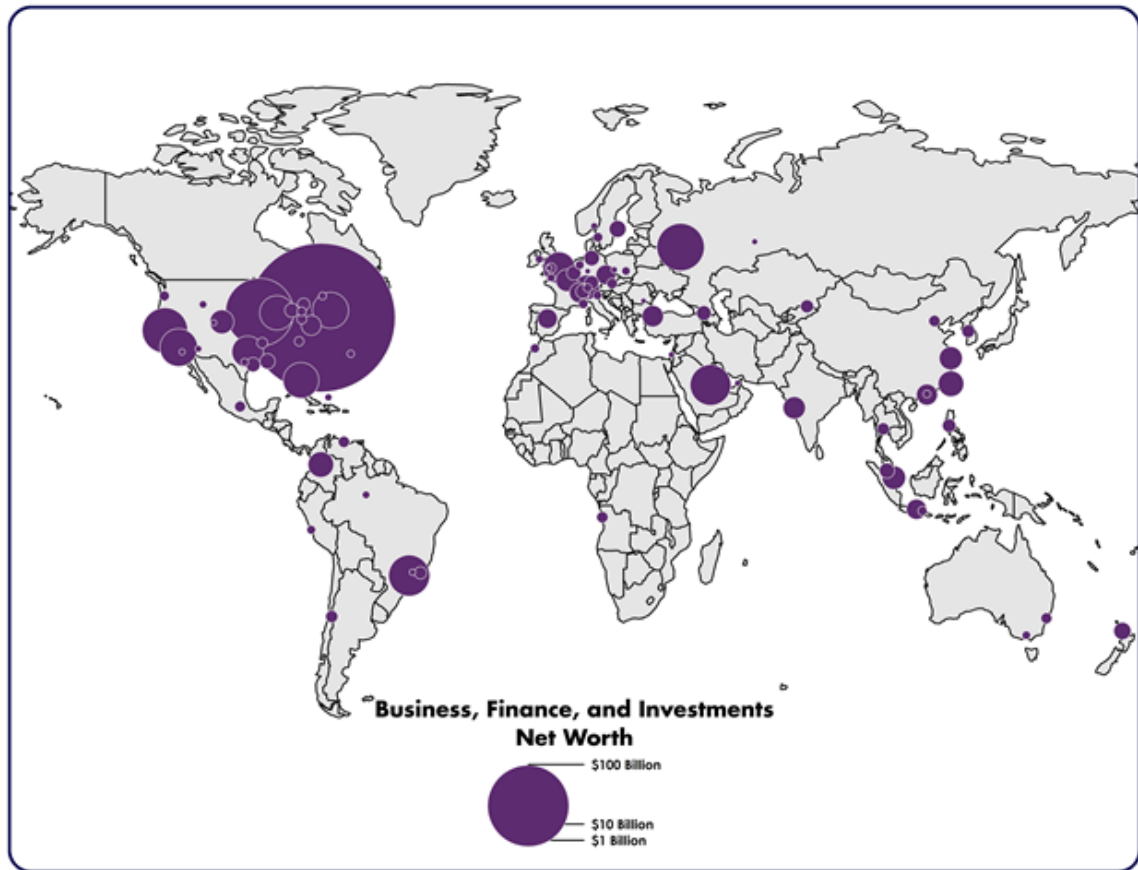
Figure 4: The Geography of Tech and Telecom Billionaires

**Business, Finance, and Investments
Net Worth**

$100 Billion

$10 Billion
$1 Billion

Figure 5: The Geography of Business, Finance, and Investment Billionaires

Figure 6: Ratio of Super-Rich Wealth to Metro Economic Output

Figure 7: Ratio of Super-Rich Wealth to Economic Output per Person