Real Estate Data used in Materialism Measurement

I] Discussion of the Real Estate Data

We define an executive as materialistic if they own a primary residence worth more than two times the average of median home prices in zip codes in the corresponding Core Based Statistical Area (CBSA) of their firm's headquarters or if they own a secondary residence worth more than 2 times the average of median home price in zip codes in that property's CBSA. Thus our measure of materialism depends heavily on the real estate values we can obtain for each executive. In the following pages we discuss the steps we have taken to assure ourselves of the veracity of the values of properties owned by an individual.

FOTT provides us with an address history for each executive, not just a summary of property title records or real estate transactions records. This means we have data on new construction, rentals, and properties held in the name of another entity. Our data also provides us with the years when the individual was associated with the property, so we can properly assign transactions through time to the correct individual.

We measure value using an average of estimated property values from Eppraisal.com, Zillow.com, Trulia.com, and Realtor.com or as of 12/31/2015. For robustness, we also measure value from a combination of sales prices or estimated values (in cases of rentals, new construction, or missing sales records) in the year the executive moved into the property.

We demonstrate using the Manhattan CBSA.

Manhattan Residential Zip Codes	
Central Harlem	10026, 10027, 10030, 10037, 10039
Chelsea and Clinton	10001, 10011, 10018, 10019, 10036
East Harlem	10029, 10035
Gramercy Park and Murray Hill	10010, 10016, 10017, 10022
Greenwich Village and Soho	10012, 10013, 10014
Lower Manhattan	10004, 10005, 10006, 10007, 10038, 10280
Lower East Side	10002, 10003, 10009
Upper East Side	10021, 10028, 10044, 10065, 10075, 10128
Upper West Side	10023, 10024, 10025
Inwood and Washington Heights	10031, 10032, 10033, 10034, 10040

Below we provide current median sales prices for each zip code as provided by Trulia.com. Median values provided by Zillow.com, Realtor.com, or Zipcodes.com (historical data is provided by Zipcodes.com and must be purchased) yields similar values.

Zip Code	Median Sales Price
10001	$1,575,000.00
10002	$1,525,000.00
10003	$1,540,000.00
10004	$1,200,000.00
10005	$1,785,000.00
10006	$740,000.00
10007	$2,800,000.00
10009	$1,284,375.00
10010	$1,250,000.00
10011	$1,812,500.00
10012	$1,600,000.00
10013	$3,150,000.00
10014	$2,031,000.00
10016	$925,000.00
10017	$850,000.00
10018	$1,200,000.00
10019	$1,462,500.00
10021	$1,730,000.00
10022	$866,500.00
10023	$1,773,469.00
10024	$1,792,120.00
10025	$1,300,000.00
10026	$890,000.00
10027	$837,500.00
10028	$1,735,000.00
10029	$477,000.00
10030	$540,000.00
10031	$651,068.00
10032	$454,000.00
10033	$415,000.00
10034	$470,000.00
10035	$750,000.00
10036	$1,050,000.00
10037	$477,867.00
10038	$1,043,706.00
10039	$797,800.00
10040	$689,000.00
10044	$540,000.00
10065	$1,325,000.00
10075	$998,000.00
10128	$1,159,000.00
10280	$765,000.00
Mean	$1,196,604.88

Based on this data, an executing working in Manhattan would need to own/rent a home with an estimated value just under $2,400,000 to be considered materialistic under our main measure of real estate. In robustness analysis we increase the threshold to 5 times the average of median home prices in the relevant CBSA. Under this criterion, an executive must own/rent a home with an estimated value just under $6,000,000.

New construction, rentals, and properties held in the name of another entity provide potential issues with identification and estimation. Below, we discuss these properties.

New Constructions

Many executives choose to construct new homes. Our address history provides us with the address of the home but property records on purchase price will generally only have data on the price paid for the land. Internet resources provide us with information to determine if a home is in fact new construction, and provide an estimate of the property's value which we can use to compute our measure of materialism.

To illustrate our process to determine new construction and estimate the value, consider the following property: 1835 73rd Avenue Ne, Medina, WA 98039. This home belongs to Bill Gates and given that the home has its own Wikipedia page, it does not seem like an invasion of privacy to discuss it. To learn whether the home was new construction and get an estimated value for the property we can use the real estate aggregator Zillow.com. Below is the Zillow link to the Gates' property:

http://www.zillow.com/homes/1835-73rd-Ave-NE,-Medina,-WA-98039_rb/?fromHomePage=true&shouldFireSellPageImplicitClaimGA=false

Zillow notes that the original purchase was for $2,050,000 in 1988. But, given that construction of the property itself did not begin until 1994, we have evidence that the purchase in 1988 was for land alone. We can verify whether the original purchase was for an existing home or for vacant land from information provided by the King County Department of Assessments. Below is the link to the Gates' property:

http://info.kingcounty.gov/Assessor/eRealProperty/Dashboard.aspx?ParcelNbr=9208900079

The department of assessment indicates that construction took place in 1994 and the tax roll history indicates the years taxable and appraised improvements to the land were first assessed to the property. Therefore, we know the purchase was for vacant land and the home subsequently built on the land.

Zillow also provides a current estimate of the value of the home at $161,352,038. While this property might be particularly hard to value, most homes have several relevant comparison properties to aid in the process. Moreover, homes of such value that it is difficult to find relevant comparisons are almost certainly going to cost more than 2 times the average price of homes in the relevant core based statistical area, so even though the dollar estimate is noisy, this will not lead to classification issues regarding our main measure of materialism.

At this point, we have verified that the home itself was new construction, and have an estimated value to use to compute our measure of materialism. Similar information can be gleaned for all properties in our sample in that we can compare the year a home was constructed to the year land was purchased via Internet sources and from the county tax assessor. Because the data provided to us by FOTT is an address history, and not a home purchase history, it is highly unlikely that homes acquired through new construction are missing from our sample or have incorrect estimates for their value. Our data also provides us with the years an individual is associated with a particular address so we can determine if the individual was associated with the home when it was constructed, or purchased the home years later (and in such cases we can use the purchase price as an estimate in that year).

Given that values for new construction are always estimates, we have two options when computing our value of materialism. We can take the estimated value of all homes as of 2015 and scale by the CBSA of the area in 2015, or we can take an estimated value in the year of acquisition (or the purchase price when available) by solving for the estimated value in the year of acquisition using the following equation:

$$\frac{E_{t-acquisition}}{A_{t-acquisition}} = \frac{E_{2015}}{A_{2015}}$$

Where E equals the estimated value and A equals the assessed value. While the ratio of estimated to assessed value is not constant over time (and the variability can vary geographically), it is hard to think of a theoretical argument for how its variance could be related bank RMI scores or tail risk, which it would need to be in order for classifications based on the error to drive our results. Our estimates of CEO materialism are correlated at over 99% whether using 2015 estimated values or a combination of actual purchase prices and estimated values from the year of acquisition.

Rental Apartments

Many executives in our sample choose to rent. This is particularly common in Manhattan where an executive may rent an apartment close to the office. It is not clear if a property an executive lives in and rents should be treated identically to one which was purchased, but we are able to collect information on properties an individual rents and verify the accuracy of such information as follows.

Our address history provides information on where an executive lives even if the property is a rental. From this information we can gain estimates of property values the same way we do for all properties. One concern could be the ability to differentiate between different units in a given building. Our address history also provides apartment numbers/designations so we are able to differentiate a penthouse condominium from another living space and accurately look up the estimated value of the correct space.

For an example of information that can be collected on condominiums (which an executive may own or rent) consider the residential condominium building located at 3 Commonwealth Avenue, Boston MA, 02116. The following link provides data from the assessor's office for the city of Boston for this building.

http://www.cityofboston.gov/assessing/search/?parcel=0502825000

The building has a master parcel number 0502825000, but each unit has its own parcel number distinguished by changing the last digit of the master parcel. Each individual unit has separate information including assessed taxable values, so these units are not identical. Our address history provides apartment or unit numbers so if we were interested in this property we could gather information for the appropriate unit in the building. The following link provides Zillow information for Apartment 3 at 3 Commonwealth Avenue:

http://www.zillow.com/homedetails/3-Commonwealth-Ave-APT-3-Boston-MA-02116/59166810_zpid/

Zillow provides a current estimated value for this specific unit, and past sales prices and assessed values, which can be verified through the assessor's office indicating that the correct unit is presented.

Real Estate held in Another Entity's Name

In some cases an executive is living in a property for which legal title belongs to another entity. This could be a spouse, but is often commonly related to family trusts. This can occur to administer the estate of a deceased relative, or be an ongoing event for personal financial reasons. Additionally, individuals occasionally transfer property held in a controlled trust for nominal sums of money ($1.00 in many cases). Of course this does not represent a true sales price or market value of the property. As noted before, our address history provides evidence that an executive was living at a home even if it is owned by another individual or trust. The address history also provides the dates the individual was associated with the property, so we can locate sales transactions if they exist and we can estimate property values at the time of transfer in addition to current estimated values. In these cases, transfer of title often does not coincide with the years an individual was present in the home. For example, an individual might occupy a home in 2000 while it is held in trust and then might purchase the home for a market or nominal fee in 2004. We can use estimated values for the year 2000, the year 2004, or the year 2015 and scale by the appropriate cost of real estate in the property's core based statistical area for that year. As discussed above, estimates of materialism using current or past property estimates are correlated at over 99%.

II] Measures of Materialism

Our primary measure of materialism is an indicator variable, *MATERIAL*, equal to 1 if the CEO owns luxury assets prior to December 31, 2013, where luxury assets include cars with a purchase price greater than $75,000, boats greater than 25 feet in length, primary residences worth more than twice the average of the median home prices in zip codes within fifteen miles of his firm's corporate headquarters, any additional residences worth more than twice the average home prices in that metropolitan area (as defined by the Core Based Statistical Area (CBSA)), and 0 otherwise.

To verify that we are adequately capturing the materialistic tendencies in an individual, we construct and verify the robustness of our results to several alternate measures of materialism. We discuss these alternate measures (some are already mentioned in the main body of the paper) in the following pages.

We recalculate a binary measure of materialism using different cut-off values – vehicles with a list price of $110,000 or greater, boats 40 feet and longer, and homes worth at least 5 times the average of median home prices in the zip codes of their firm's CBSA. While the cutoff figures are significantly different, the measure is highly correlated with the original measure. Under these requirements, all frugal CEOs under the original measure are still frugal under this measure, and all materialistic CEOs under this measure are materialistic under the original measure. The only individuals who are classified differently are those who were originally classified as materialistic specifically because of assets within the higher and lower range of the two methods. As such, the measures are highly correlated and yield nearly identical results.

Next, we develop an ordinal measure of materialism by counting the number of materialistic assets an individual owns all individuals who are frugal using a binary measure have 0 lavish assets so this measure really just creates variation in the group defined as materialistic. We can calculate this measure in real time, or by choosing the peak level and applying that as a static measure. This measure has some appeal in that one aspect of materialism is this desire to keep acquiring more goods over time and the measure captures that. However, it is not clear that it is appropriate to treat an individual who has purchased two $100,000 cars as more materialistic than an individual who has purchased one $250,000 car. Results using an ordinal measure are highly correlated with results using a binary measure. Given that both measures classify frugal CEOs in the same manner, the only way this measure would create different results is if the associations between materialism and our dependent variables were distributed like an inverted U where "moderately" materialistic CEOs drove the results and highly materialistic CEOs behaved as frugal CEOs.

Given that our real estate data is more complete than data for vehicles or boats, we recalculate materialism only using real estate data. Under this measure, every individual classified as frugal is still classified as such, and all individuals who owned a materialistic home are classified as materialistic. Individuals classified as materialistic based solely on vehicle or boat ownership are now classified as frugal. The measure is highly correlated with our original measure and our empirical results are similar, though in some cases they are stronger when we use vehicle and boat data, suggesting that it is informative and that such individuals should be considered materialistic under our methodology. We also create three groups – frugal, materialistic without real estate, and materialistic with real estate – and compare results for these groups to one another. We find that the two materialistic groups are statistically similar to one another and significantly different from the frugal group.

We calculate a continuous measure of materialism based on the dollar value (or estimated value) of an individual's assets. We can calculate this measure in real time or as a static measure using the peak value of assets. Because we do not have boat prices available to us, they are estimated from a model that considers length, manufacturer, model, and year. While these inputs are all strong determinants of price, the unique nature of boats and the ability to customize means that individual observations could be poorly estimated. A continuous measure potentially offers advantages in that a $20 million dollar home might be indicative of a higher level of materialism than a $10 million dollar home (assume in the same geographic location). However, this is not a given. Particularly as it pertains to our hypotheses, it is possible that after a certain level of materialism increases are not predictive. Moreover, in our binary measure we have no reason to believe our classification is influenced by an individual's wealth as every CEO in our sample can easily afford a $75,000 vehicle, a boat greater than 25 feet long, or a home worth twice the

average of median home prices in their firm's CBSA. However, a CEO's wealth can influence a continuous measure. The richest CEOs in our sample can afford assets worth more than the entire net worth of the least rich CEOs in our sample. This potentially leads to mis-measurement. To address this we can scale the value of assets by an individual's wealth but now the measure has numerator and denominator affects that can vary independently. Assume a CEO with a net worth of $100 million (primarily from stock in his firm) owns assets worth $10 million. If in the next year his firm's stock price increases by 20% and his net worth increases by $20 million that individual has to spend another $2 million on vehicles, boats, or homes or else his measured value of materialism will decrease even though there is no reason to believe the individual has become less materialistic simply because his net worth increased. Further, it is likely not reasonable to compare spending rates for ultra-rich individuals. As wealth increases an individual generally spends a smaller proportion of wealth on real estate, vehicles, or boats. While in theory there is no limit to the value of these assets an individual can purchase, in practice there likely is. Consider an individual worth $50 million dollars. Such an individual might purchase a home worth $10 million dollars, a yacht for $4 million, and own $1 million in vehicles. This individual has spent 30% of their net worth on these assets. Now consider an individual worth $500 million. It is highly doubtful that this individual would need to spend $150 million on real estate, vehicles, and boats to be considered as materialistic as the first individual. There is a practical limit on how much one spends on these things. Finally, it is not clear that the marginal dollar spent on a vehicle is equivalent to the marginal dollar spent on a home nor is an appropriate weighting factor obvious. While a continuous measure has intuitive appeal, it also has many limitations and weaknesses. That said, it still exhibits a strong correlation with our binary measure (the CEOs with more valuable assets are going to be classified as materialistic using a binary measure) and our results are similar. Results using a continuous measure are sensitive to outliers in terms of wealth or asset values and winsorizing the data produces more stable and consistent results.

To conclude, our choice of the primary measure of materialism using the binary model was motivated by the high correlation of this measure with all of the above alternative measures, the ease of its interpretation, the ability to estimate certain models using this measure, and last but not the least, the simplicity of the measure.