Project Summary Housing Affordability Data for CLF Equity Atlas 2.0

1. **Scope**

   The scope of this project is limited to the portion of the Equity Atlas that measures the housing affordability in the tri-county area, Clackamas, Multnomah and Washington County. Specifically the collected data will be used to generate maps similar to the following Equity Atlas maps.
   a. Single-Family Housing Affordability, http://equityatlas.org/maps/map3-1a.pdf
   b. Single-Family Housing Affordability: 2004 Incomes, 1995 Prices, http://equityatlas.org/maps/map3-1b.pdf
   c. Percent Change: 1990-2000: Median Value Owner-occupied Single-family Housing, http://equityatlas.org/maps/map3-2.pdf
   d. Percent Change:1995-2004: Median Sale Price Single Family Homes, http://equityatlas.org/maps/map3-3.pdf

   The updated maps will use the 2000 and 2010 tax lot and census information.

2. **Stakeholders**

   A number of groups are collaborating on the CLF Equity Atlas. Below is a list of key organizations and contacts.
   a. Coalition for a Living Future (CLF), contact: Kris Smock
   b. Portland State University (PSU), contact: Meg Merrick
   c. Metro, contact: Clint Chiavarini

3. **Methodology**

   The methodology for acquiring and mapping the data should be similar to the methodology used for Equity Atlas 1.0[1,2]. The methodology must be consistent with the methods used by PSU, Metro and CLF.

4. **Data**
   a. **Source**

      Tax lot information has been provided by Metro for the years 2000 and 2010. The tax lot data will be used to determine median sales price per aggregate geography. The housing sales data will be used in all 4 maps within the scope of this project. The median sales price will be used to determine the percent change in house prices.

   b. **Indices**

      Following is a summary of standard indices that are calculated using Census Data and other resources. The indices are used for calculating regional values for the maps outlined in section 1, Scope.

      i. **Median Income 2010[3]**

         Median Income is used to calculate housing affordability.

County	Median Household Income 2006-2010[3]
Washington	$62,574
Clackamas	$62,007
Multnomah	$49,618
Clark, WA	$58,262
4 County Average	**$58,115**

ii. Housing Affordability Index[4,5]

The housing affordability index is **$199,800**. The affordability index was calculated based on the 2011/2012 lending environment.

Assuming an annual income of $58,115, a down payment of $10,000, an interest rate of 4% and a household debt of less than 8% of the annual income, a buyer would qualify for a $189,800 30 year fixed rate loan. This assumes a 28/36 qualification ratio. Note: Since the down payment is less than 20% of the mortgage would be required as part of the mortgage payment.

iii. Median Home Value 2000[8,9]

The median value of a home in 2000 is used to calculate the percent change in housing values between 2000 and 2010.

Multnomah	$157,900
Washington	$184,800
Clackamas	$199,000
Clark,WA	$147,000
Average Home Value	**$172,175**

iv. Median Home Value 2010[3]

The median value of a home in 2010 is used to calculate the percent change in housing values between 2000 and 2010.

Multnomah	$281,600
Washington	$303,700
Clackamas	$331,100
Clark, WA	$260,800
Average Home Value	**$294,275**

v. Median Housing Value Increase 2000-2010

The median house value increase from 2000 to 2010 is the regional value. The value is calculated by taking the difference between the average home values in 2010 and 2000 then dividing the difference by the average 2000 home value.

$$(294,275 - 172,175)/172,175 = \textbf{.71}$$

vi. Inflation Between 2000 to 2010[7]

The inflation rate between 2000 and 2010 is needed to calculate the affordability of houses if the housing prices kept pace with inflation. Inflation between 2000 and 2010 equals (218.1-172.2)/172.2 = **0.27**

Consumer Price Index Table

1995	152.4
2004	188.9
2000	172.2
2010	218.1 (218.056)

5. Unknowns

a. Determining Owner-Occupied Homes via Tax lot Data

The Census Bureau changed how and what data would be collected in 2010. The long form census data was replaced by the American Community Survey (ACS). The ACS began in 2005. The housing information is now conducted as part of the ACS. The ACS collects data on a continuous basis over a 5 year period. The previous equity atlas used 2000 block data for map 3-2, Percent Change 1990-2000: Median Value Owner-occupied Single-family Housing.

Block or tract data is unavailable in a single year ACS summary table. Only the data in 5 year ACS summary tables are optionally organized using census blocks and tracts. The data set for 2006-2010 is available. The prior map reflects a percent change in median home values between the values in 1990 and the values in 2000. If the 5 year ACS data were to be used, the map could not communicate the same information. If the ACS data proves to be inadequate, the tax lot data will be used to determine owner-occupied single family residents. The owner address can be compared with the site address to determine if the residence is owner-occupied. It has already been determined that condos are marked as multi-family residents. Whether or not this methodology will work has not been determined.

b. Geographic Extent

Map 3-2 uses tax lot data outside the tri-county, Portland-Metro area. The map includes data for Columbia, Yamhill and Clark counties. The subtitle specifically mentions the Portland-Vancouver metropolitan areas. The project description provided by CLF indicates that the tax lot data from Metro includes the tri-county area as well as Clark County. The data may not include Yamhill and Columbia County.

c. Geographic Unit

Three of the four maps included in the scope of this project use neighborhood as the geographic unit. One of the maps uses census block groups. Census tracts are used for this analysis.

References

1. The Regional Equity Atlas, Appendix B: Map Methods and Notes, pg 133-134, Chapter3: Housing, http://equityatlas.org/chapters/Methodology.pdf
2. The Regional Equity Atlas, Appendix A: Neighborhood and City Summary Table, http://equityatlas.org/chapters/NeighborhoodTable.pdf
3. U.S. Census Bureau, State & County Quick Facts: Oregon, Last Revised,17-Jan-2012 http://quickfacts.census.gov/qfd/states/41000.html, http://quickfacts.census.gov/qfd/states/53/53011.html
4. Freddie Mac, 30-Year Fixed Rate Mortgages Since 1971, Copyright 2012. http://www.freddiemac.com/pmms/pmms30.htm
5. Homefair, Mortgage Affordability Calculator, Copyright Move, Inc. 2006. http://www.homefair.com/tools/mortgage-affordability-calculator/index.asp
6. Oregon Property Tax Statistics, Fiscal Year 2011-2012, Oregon Department of Revenue, Pg 7, http://www.oregon.gov/dor/STATS/docs/303-405-12/property-tax-stats_303-405_2011-12.pdf?ga=t
7. Historical CPI-U data from 1913 to the present, InflationData.com, Copyright 1996-2012, Capital Professional Services, http://inflationdata.com/inflation/Consumer_Price_Index/HistoricalCPI.aspx
8. Oregon:2000 Summary Social, Economic, and Housing Characteristics, 2000 Census of Population and Housing Characteristics, US Census Bureau, Issued March 2003, page 154, Table 26 Home Value 2000, http://www.census.gov/prod/cen2000/phc-2-39.pdf
9. Clark County Washington, Census Quick Facts, Copyright 2012, Clark County, Washington, http://gis.clark.wa.gov/gishome/Census/2000/?pid=quickfacts

Calculating Housing Indices Using Tax Lot Data

Since we decided not to use the American Community Survey data to gather information on median home values, I'm using the tax lot data to calculate the median home values as well as the sales prices. Below is series of tables with my calculations.

Range 1 Median Sales Price

Area	Value	Count	% Total	Total
Clark County	222721	21250	0.233365	51975.33
Metro	254456	69809	0.766635	195074.8
			Average	247050.2

Range 2 Median Sales Price

Area	Value	Count	% Total	Total
Clark County	256095	10942	0.224585	57515.07
Metro	310224	37779	0.775415	240552.4
			Average	298067.4

Range 1 Median Value

Area	Value	Count	% Total	Total
Clark County	156050	75556	0.386077	60247.28
Metro	211686	120146	0.613923	129958.9
			Average	190206.2

Range 2 Median Value

Area	Value	Count	% Total	Total
Clark County	246890	97246	0.235052	58032.02
Metro	305287	316475	0.764948	233528.6
			Average	291560.7

Affordable Price =   199800
Affordability Index = Affordable Price/Median Sales Price =   0.685278

Change in Median Value (range2 - range1) /range1 =   0.532866

Change in Median Home Price (range2 - range1)/range1 =   0.206506

The Regional Values (RV) can be calculated using the values above. The affordable house price for the average Metro and Clark County income was calculated previously in the Project Summary.

Methodology for determining the values used for sales price for the two temporal ranges, 2001-2005 and 2008-2010, of home sales.

1. After selecting records for the Clark County and Metro sales within the temporal ranges, I combined the Clark County and Metro tables based on their temporal range. At the end of this step I had a table of 2001-2005 home sales and a table for 2008-2010 home sales.

2. For each record I calculated the percentage of difference between the sales price of a home and its total value.   The formula is (100 * ((Sales Price – Total Value)/Total Value). This formula will give values between -100 and 100.

3. I created histograms for the 2 temporal ranges. I had 3 expectations. One, a large percentage of the sales prices would be way below the home value in both datasets. Two, the early range of values would be skewed to the negative end of the graph because sales price was compared against a 2010 valuation. Three, most of the sales would be close to 0%, i.e. a house is more likely to listed and sold if the listing price is around the sales price.

4. I took the total number of records in each temporal range and subtracted the number of records with 0 sales values.   The 2001-2005 range had 98,565 non-zero sales price records. The 2008-2010 had 56259.

5. I selected ranges of percentages that netted between 95 and 97% of the records for each temporal range. For 2001 to 2005 that range is -67% to 58% (96%). For 2008 to 2010 that range is -45% to 51% (97%).

Below are the histograms for the datasets.
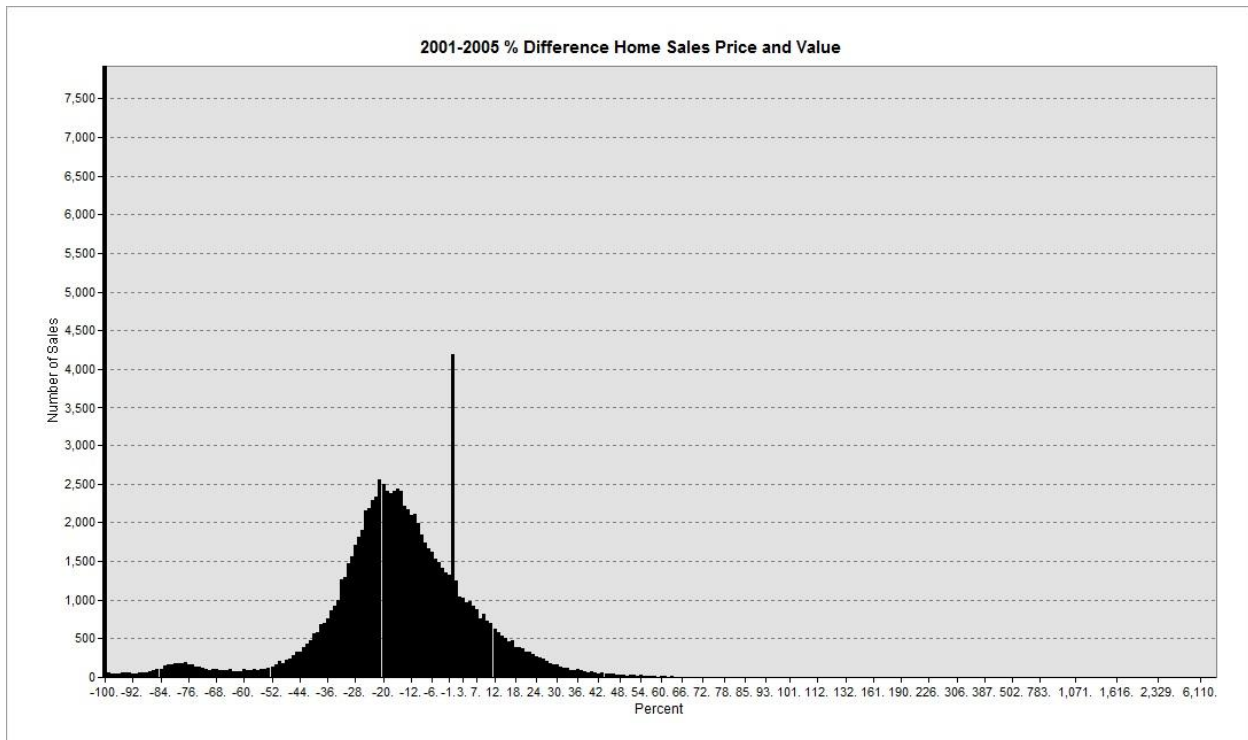
Note that the 2001 to 2005 histogram above is skewed towards that negative end of percentages. Also notice that small spike between -84 and -68. The sales indicate that the homes were significantly undervalued.
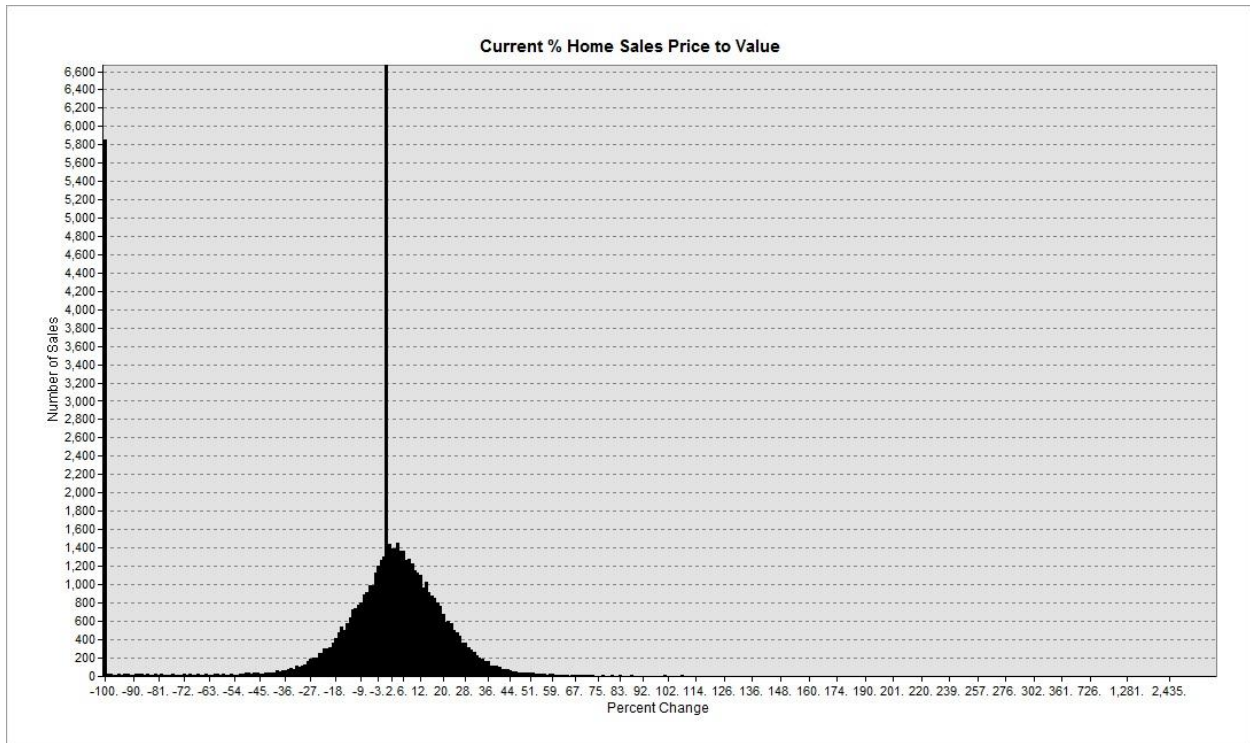
The more current sales histogram shows a more "normal" bell curve.

Both histograms include the zero sales, so they both have a spike around -100. Both graphs contain outliers at the positive end as well as the negative end.

TABLE ATTRIBUTES

Housing indicators are based on owner occupied single family homes on less than 10 acres. The values are calculated per neighborhood. The data was acquired from tax lot information from Portland Metro and Clark County GIS, therefore any errors in the tax lot data has been inherited by this data**.**

CURVAL - The current (2011 for Metro, 2010 for Clark County) median home value

fCURVAL – The number of samples included in the current median home value

PREVAL – The previous (2001 for Metro, 2000 for Clark County) median home value

fPREVAL – The number of samples included in the previous median home value

CURPRC – The median sales price of homes in the years 2008 to 2010

fCURPRC – The number of samples included in the 2008-2010 median sales price

PREPRC – The median sales price of homes in the years 2001 to 2005

fPREPRC – The number of samples included in the 2001-2005 median sales price

VALCHG – The change in value between PREVAL and CURVAL. The average change or regional value is 20.7%

PRCCHG – The change in value between PREPRC and CURPRC. The average change or regional value is 53.3%.

AFBLTY – The affordability of a home compared with the median sales price. The value is based on a 2006-2010 average salary of $58,115/year using the 2011/2012 lending environment. The affordable home should be at most $199,800. The average value or regional value is 68.5%

INFPRC – The median sales price of a home, if the home prices kept pace with inflation from 2000 to 2010.

INAFF – The affordability of a home based on current income and a 2000 median home value adjusted by the inflation rate between 2000-2010.

DATA PROCESSING

Clark County Tax Lot Information

Attributes Used

- ZIP1 – Owner's zip code
- ZP1 – Site Zip Code
- SHAPE_AREA – Parcel size in square feet
- PT1 – Land Use Code (10-19 Residential, 511-518 Residential on Commercial Land)
- SYEAR – The year the property sold
- SAMOUNT – The selling price of the property
- TOTPROP – Total property value

Metro Tax Lot Information

Attributes Used

- OWNERADDR – Address of the property Owner
- SITEADDR – Address of the property
- AREA - Parcel size in square feet
- LANDUSE – Land use code (SFR, MFR (Condos))
- SALEDATE - The date the property sold
- SALEPRICE – The selling price of the property
- TOTALVAL – Total property value

Census Tract Data Used

- Tract – the tract number

Neighborhood Data Used

The neighborhood shapefile was taken from RLIS. The data was dissolved on the attribute "NAME". One name had to be edited prior to the dissolve. The Milwaukie #1 neighborhood was made up of 2 polygons in the RLIS data, but the spellings didn't match, "Milwaukie #1" and "Milwaukie # 1".

Need Per Geography (Tract or Neighborhood), Shapefile Attributes

- Average Selling Price (2000-2005, 2008-2010)
- Average total Value (2000, 2010)
- Affordability Index
- Difference in Median Price Between 2000 and 2010
- Difference in Median Value Between 2000 and 2010
- 2010 Home Values if they only increased at the inflation rate

We have 4 data sets to process, 2000 and 2010 Clark County tax lot shapefiles, and 2001 and 2011 Metro tax lot shapefiles. Please note that the years do not precisely match.

1. **Selecting Owner Occupied Single Family Residence on less than 10 acres**
   1.1. *Select the properties that have land use codes for single family homes*
       1.1.1. Clark County, Select By Attribute on PT1 between 10 and 19 OR between 511 and 518.
       1.1.2. Metro, Select By Attribute using PROP_CODE (18 codes represent owner occupied SFR)
           - Residential: 101, 102, 121, 122, 131, 132, 14, 15, 151, 191
           - Tract: 451
           - Farm: 501, 541, 551
           - Forest: 601, 641, 651, 681
   1.2. *Select the properties that are owner occupied*
       1.2.1. Clark County, Select By Attribute comparing zip codes (ZIP1 = ZP1) and building value is greater than 0
       1.2.2. Metro, Select By Attribute comparing addresses (OWNERADDR = SITEADDR) and owner address is not blank
   1.3. *Select the properties on less than 10 acres. I used the shape area, because the taxed area was not always set. The shape area is in square feet.*
       1.3.1. Clark County, Select By Attribute, Shape_Area < 43602
       1.3.2. Metro, Select By Attribute, AREA < 43602
2. **Aggregate on Geometric Unit , results go in an .mdb database**
   2.1. *Find centroids for each Property, Feature To Point*
   2.2. *Join the properties to the geometric unit file, Spatial Join, Intersect, join one to one*
3. **Summarize Data By Tract, results go in an .mdb database**
   3.1. *Median House Value*
       3.1.1. Clark County, Summary Statistics, TOTPROP Mean per TRACT
       3.1.2. Metro, Summary Statistics, TOTALVAL Mean per Tract

Metro sales dates are text values, so a new field needs to be created to convert the sales dates to range values

1. **Convert Dates from 'TEXT' to 'SHORT INT'**
   1.1. Add a field 'isdate' that represents the year ranges, 2001-05, 2008-10
   1.2. Calculate Field values are 0, 1, 2 for no range, range 1, range 2

For the current data sets, 2010 for Clark County and 2011 for Metro

2. **Summarize the Sales Prices, 2000-2005 and 2008-2010, per geography, results go in an .mdb database**
   2.1. *Make two data sets, one for Sales between 2000 and 2005, the other between 2007 and 2010*
       2.1.1. Clark County
           2.1.1.1.   Select By Attribute, SYEAR between 2001 and 2005 AND SAMOUNT > 0
           2.1.1.2.   Select By Attribute SYEAR between 2008 and 2010 AND SAMOUNT > 0

2.1.2. Metro

2.1.2.1.   Select By Attribute isdate = 1 AND SALEPRICE > 0

2.1.2.2.   Select By Attribute isdate = 2 AND SALEPRICE > 0

2.2. Eliminate Outliers

2.2.1. For each dataset calculate the percent of home sales price to value (100 * ((Price – Value)/Value))

2.2.2. For the datasets of sales between 2001 and 2005, select records with a percentage between -67% and 58% (96% of records)

2.2.3. For the datasets of sales between 2008 and 2010, select records with a percentage between -45% and 51% (97% of records)

2.3. Summarize Data per Tract

2.3.1. Clark County, Summary Statistics, SAMOUNT Mean per Tract

2.3.2. Metro, Summary Statistics, SALEPRICE Mean per Tract

Merge the tables with the Geometric Units Shapefile

1. **If the geometric units are census tracts, remove the demographic data from the shapefile**
2. **Combine the Clark County summary tables with the Metro tables**
   2.1. *Merge Clark County 2010 median value with Metro 2011 median value*
   2.2. *Merge Clark County 2000 median value with Metro 2001 median value*
   2.3. *Merge Clark County 2010 range 1 average price with Metro 2011 range 1 average price*
   2.4. *Merge Clark County 2010 range 2 average price with Metro 2011 range 2 average price*
3. **Join the statistic field with its frequency into the shapefile**
   For each summary statistic the frequency is also added. The frequency is needed to determine if the numbers of samples are sufficient to determine a trend. The previous Equity Atlas required at least 10 samples per geometric unit.
4. **Calculate Affordability, Percent Change Median Value, Sales Prices differences per tract.**