

Strong Dollar Risk

BY ADAM OZIMEK

The real trade-weighted value of the U.S. dollar has been on a tear in recent months, rising 10% over the year through January to its highest level since 2003 (see Chart 1). Paradoxically, while this is being driven by a stronger U.S. economy, it is also likely hurting some parts of the economy. Given that there is little reason to expect the dollar's run to [end soon](#), it is important to understand which parts of the economy are being hurt and which are not. To understand this, sensitivity to the dollar is computed for industries and for metro areas using detailed employment data. Exploring the variation of sensitivity by industry and geography can illustrate why some metro areas and industries may be hurt while others are helped by a strong dollar.

An empirical examination is necessary, as a stronger dollar will have a mixed effect on the U.S. economy. Businesses that export find that their products and services become more expensive to customers around the world, hurting demand, sales and profits as competitiveness erodes. However, while exports become more expensive, imports to the U.S. become cheaper. This has both positive and negative effects. Cheaper imports benefit businesses that use them as inputs. They also benefit households that consume imports because the lower dollar prices of such goods and services leave more discretionary income to purchase other goods and potentially benefit other domestic business-

es. On the other hand, cheap imports mean more competition for manufacturers who sell their goods to U.S. customers.

Given the likely effects of trade exposure on industries, one way to gauge which industries will be hurt by the dollar would be to examine their export intensity. However, some heavy exporters are also heavy importers. For example, a manufacturing company may sell its goods all over the world, but rely heavily on imported steel. For it a strong dollar will hurt sales, but will help on costs.

Because the effects can be helpful or harmful, it is difficult to know a priori which metro areas and industries will benefit and which will be hurt by a strengthening dollar.

about the factors that determine which is helped and which is hurt.

Industry

A dollar sensitivity measure is estimated using a separate regression model for each of 66 industries that generally correspond to the Bureau of Economic Analysis' three-digit North American Industry Class System.¹ The dependent variable for the models is annualized quarterly employment growth for each industry from 1990 to 2015, and the independent variable of interest is the quarterly trade-weighted dollar over the same period. Controls that account for the overall strength of the economy, cyclical factors, and general trends in the industry's employment are included.

The coefficient on the trade-weighted dollar can be interpreted as the industry's sensitivity to the dollar. A negative coefficient suggests that a stronger dollar hurts employment growth, and a positive coefficient suggests it helps.

Appendix 1 ranks the industries by their sensitivity to the dollar. The industry most

Chart 1: The Dollar Is Strengthening

Real trade-weighted dollar, Mar 1973=100



Sources: BLS, Moody's Analytics

Thus an empirical model is used to determine the industries and metro areas that have historically exhibited the greatest sensitivity to the dollar after controlling for other factors. These sensitivity measures are then compared to industry and metro area characteristics to learn

¹ Industry groupings come from BEA input-output tables. Exceptions from three-digit NAICS include a few cases when two- or four-digit NAICS are used. In addition, the BEA sometimes combines multiple NAICS into one category. For example, NAICS 311 (food manufacturing) and 312 (beverage and tobacco product manufacturing) are combined.

hurt by a strong dollar is pipeline transportation, where a 15% appreciation in the dollar decreases job growth in the industry by 4.1 percentage points. In contrast, that same dollar appreciation would boost construction employment growth by 1.5 percentage points. The T-statistics suggest that the dollar has a statistically significant effect in 25 out of 66 industries, with more hurt by the dollar than helped.

Several broad trends are apparent from these results. First, manufacturing industries tend to be hurt by a stronger dollar, with apparel being the most sensitive. Oil-related industries are also negatively affected, including pipeline transportation and oil and gas extraction.

Fewer industries are positively related to a strong dollar. However, construction and other real estate have positive statistically significant coefficients, suggesting the housing market may benefit from a stronger dollar.

These general trends provide support to the theory that industries competing in the global market are more sensitive to the dollar. Manufacturing and oil-related industries export and compete with imports, and both are hurt by a strengthening dollar. In contrast, the positive effect of a stronger dollar on housing could be due to the fact that houses cannot be exported.²

Regression can be used to test this theory more precisely by examining whether industry sensitivity coefficients can be explained by their relative trade exposures (see Table 1). Import and export shares of GDP for each industry are measured using the BEA's input-output tables. Imports do not capture imports for consumption by households, but imports for use by the industry in producing output.

The results suggest that the export share of an industry's GDP leads to greater harm from a strong dollar. Counterintuitively, the more imports the industry uses in production, measured using the BEA's input-output tables, the greater the harm from a strong dollar. However, when both measures are

2 A strong dollar can reduce foreign investment by making it more expensive, and so in theory housing is not entirely isolated from the potential harm of a stronger dollar.

Table 1: Industry Dollar Sensitivity Regressions

Dependent variable: industry dollar sensitivity coefficient

	Coefficient				
	Model 1	Model 2	Model 3	Model 4	Model 5
Export share of GDP	-0.19*		-0.14		-0.12
Import share of GDP		-0.36*	-0.16		-0.17
Tradability proxy				-0.71**	-0.65*
Constant	0.01	0.01	0.01	0.01	0.02*
Sample size	64	64	64	64	64
Adjusted R-squared	0.09	0.07	0.1	0.11	0.19

Notes:

1. *** denotes estimate significant at 0.1%, ** at 1%, and * at 5%.
2. Sample weighted by metro area employment, and variance clustered at the state level.
3. Petroleum and coal products (NAICS 324) is dropped as an outlier, and federal government is excluded.

Sources: BLS, Moody's Analytics

included in the model neither are statistically significant, suggesting the effect of imports may be due to collinearity with export dependence.

As a final robustness check, the measure of tradability from Mian and Sufi (2014)³ is used in the regression model. This measure is based on the concentration of industries within specific geographies. An industry that is equally distributed across metropolitan statistical areas is assumed to be nontradable, and will have a lower score. An industry that is highly concentrated in a few geographies is assumed to be tradable and will have a high score. For example, compared with the average industry score of 0.026, grocery stores have a low score of 0.012 because most MSAs have grocery stores. Apparel and leather manufacturers have a high score of 0.116, because production is concentrated in a few MSAs. The regression results show that industries with a high tradability score are hurt more by the strong dollar. This measure alone can explain 11% of the variance in dollar sensitivity, and remains statistically significant even when export and import share of GDP are included in the model.

All three trade exposure measures combined can explain 19% of the variation in

3 Atif Mian and Amir Sufi. "What explains the 2007-2009 drop in employment?" *Econometrica: Journal of the Econometric Society* 82.6 (2014): 2197-2223.

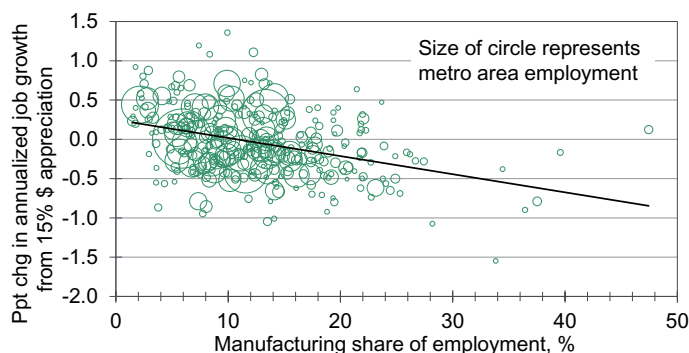
dollar sensitivity, suggesting trade exposure is an important determinant of how an industry is affected by a dollar.

An important caveat is that these broadly defined industries differ in many important ways that are not measured. For example, tradability is just one of many fundamental ways that the apparel manufacturing industry differs from grocery stores. Given these significant differences, it is possible that some omitted variable is really responsible for the correlation between dollar sensitivity and trade exposure.

To ensure the effect of the dollar is truly being measured, the same analysis can be done while focusing solely on detailed manufacturing industries. A manufacturing-specific analysis can rely on more refined industry definitions thanks to the availability of detailed import and export data for manufactured goods. A similar regression model as before is estimated for 79 detailed manufacturing subsectors that correspond to three- or four-digit NAICS codes. Importantly, this model controls for growth in overall manufacturing and the coefficients therefore capture whether the subsector is more affected by a strong dollar relative to overall manufacturing. Import data for manufacturing is also broader, capturing goods imported for consumer and industry use.

The results suggest that within manufacturing, a high level of imports is a greater

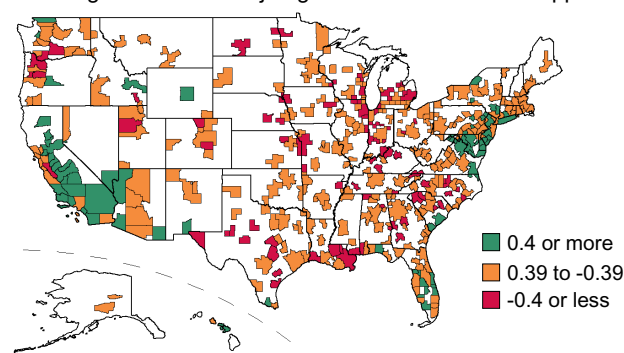
Chart 2: Bigger Dollar Effect on Mfg Areas



Sources: BLS, Moody's Analytics

Chart 3: Effect of Strong Dollar Varies

% change in annualized job growth from 15% dollar appreciation



Source: Moody's Analytics

risk factor than a high level of exports. For example, apparel manufacturing is one of the most negatively affected by a strong dollar despite exports being around the average for a manufacturing subsector. However, apparel has the second highest ratio of total imports to U.S. manufacturing output, with imports greatly outnumbering U.S. output. The high sensitivity to a strong dollar is therefore more likely due to competition against imports in the U.S. marketplace than competing globally.

The industry level results suggest that trade exposure overall matters significantly in determining which industries will be hurt most by the dollar. Manufacturing and other highly tradable sectors are among the most at risk. However, within manufacturing, risk is more related to competition with goods

imported to the U.S. than competition of exports in the global market.

Geographic exposure

It is not just industries that have different exposure to the risk of a strong dollar, but regions as well. This is due not only to differing industry mixes, but also to differences in demographics. Cheap imports benefit households and free up discretionary income for further spending, but the extent will vary by household spending patterns, which in turn depend on household demographics. As with industries, the effects are likely to be mixed, meaning it is an empirical question of who will be helped and who will be hurt by a strong dollar.

To estimate metro area dollar sensitivity, a separate regression is run for each metro

area. Annualized quarterly metro area job growth from 1990 to 2015 is the dependent variable, and the variable of interest again is the trade-weighted dollar from the same time period. Controls are included for lagged metro area job growth, as well as for current and lagged U.S. job growth.

Several broad trends emerge from the results (see Table 2). The dollar has a statistically significant effect on about one-fourth of the 401 metro areas, with slightly more affected negatively than positively. Consistent with the industry results, metro areas with higher manufacturing concentrations are more likely to be hurt by a strong dollar (see Chart 2). Metro areas in the Midwest are more likely to be hurt, while metro areas in Florida appear to disproportionately benefit (see Chart 3).

Regressing the metro areas' dollar sensitivity coefficients on a set of metro area characteristics helps shed light on why some areas benefit while others lose (see Table 3). The results show statistically significant effects of the share of jobs in manufacturing and information, which is unsurprising given that these industries tend to be more globalized. In addition, even after controlling for industry structure, metro areas where exports make up a greater share of GDP are also more likely to be hurt by a strong dollar.

The share of jobs in finance also has a negative effect in the model without state fixed effects. In contrast, the industry-level models showed mixed results for finance, with some subsectors being negatively related to the dollar and some being positively related. One possible explanation is that fi-

Table 2: Manufacturing Dollar Sensitivity Regressions

Dependent variable: industry dollar sensitivity coefficient

	Coefficient				
	Model 1	Model 2	Model 3	Model 4	Model 5
Export share of GDP	-0.09		-0.03		-0.04
Import share of GDP		-0.04**	-0.04*		-0.05**
Tradability proxy				-0.28	0.37
Constant	0.02	0.01	0.02	0.01	0.01
Sample size	79	79	79	79	79
Adjusted R-squared	0.04	0.11	0.12	0.01	0.13

Notes:

1. *** denotes estimate significant at 0.1%, ** at 1%, and * at 5%.
2. Sample weighted by metro employment, and variance clustered at the state level.

Sources: BLS, Moody's Analytics

Table 3: Metro Sensitivity Regression

Dependent variable: metro area dollar sensitivity

	OLS	Fixed-Effects
Construction/natural resources	-0.001	-0.001
Manufacturing	-0.002***	-0.001***
Trade/transportation/wholesale	0.000	0.000
Information	-0.006***	-0.005*
Finance	-0.003***	-0.002
Professional/business services	-0.001	0.000
Education and healthcare	0.000	0.000
Leisure and hospitality	0.000	0.000
Other services	-0.005*	-0.007***
Export share of metro GDP	-0.001**	0.000
% of population over 65	0.002**	0.002*
Log median income	0.000**	0.000
% of population foreign born	0.000**	0.000
Constant	-0.004*	-0.002
Sample size	400	400
Adjusted R-squared	0.410	0.171

Notes:

1. *** denotes estimate significant at 0.1%, ** at 1%, and * at 5%.
2. Variance clustered at the state level, OLS model utilized employment weights.

Sources: BLS, Moody's Analytics

financial services are more globalized in some areas of the country than in others, creating a range of dollar sensitivity across the metro areas, but not for the U.S. overall.

The results also generally show that the mix of service-sector employment does not have a statistically significant impact on dollar sensitivity. This result is intuitive given that service-producing industries tend to be less tradable, and is consistent with the industry results showing less dollar sensitivity for services in general. The other-services industry is the lone outlier in this regard.

Demographics play a part as well. Metro areas with a greater share of the population older than 65 are more likely to be helped by a strong dollar. This is likely because retired workers are not hurt by weaker exports, but are helped by cheaper imports.

A higher median household income helps to reduce the dollar sensitivity of metro areas. This could reflect a mix of financial capital and human capital that allows wealthier metro areas to more easily weather negative economic shocks. A greater foreign-born share of the population also helps to reduce

dollar sensitivity. This could be because a strong dollar makes remittances more valuable, and therefore increases the labor supply of immigrants, either through migration or labor force participation of the existing foreign-born population.

Metro area risks

These results show which factors matter for dollar sensitivity, and can help explain some of the metro areas that are the most helped and the most hurt by the strong dollar (see Appendix 2).

Five of the top 10 most positively affected metro areas are in Florida, including Homosassa Springs and The Villages, which rank first and second, respectively. This illustrates the importance of demographics, as these same five Florida metro areas are also among the top 10 for share of the population over age 65.

The effect of immigration can also help explain some of the positive dollar effects in metro areas in California and New Jersey, which have significant immigrant populations. For example, Oxnard-Thousand Oaks-Ventura CA has a strong positive effect of

the dollar and has a foreign-born share of the population that is 10 percentage points higher than the U.S. average.

The importance of manufacturing helps to explain why the Midwest, with its high concentration of manufacturers, appears more likely to lose. For example, the metro area that is most hurt by a strong dollar is Kokomo IN, which also has the fifth highest manufacturing share of employment in the country. Cleveland TN is the second most hurt and has more than double the U.S. manufacturing share of employment.

The detailed industry regressions suggested that oil-related industries were significantly harmed by a strong dollar, which helps explain why several Texas metros areas are among the most harmed. Odessa and Midland are the fifth and eighth most negatively affected, and both depend heavily on the oil industry. Altogether, metro area characteristics can explain 41% of the variation in dollar sensitivity, which leaves a substantial amount unexplained. Some of this is due to the fact that employment shares and trade data measures are broad and imperfect and do not capture the full supply chain and tradability of an industry in a metro area. For example, detailed manufacturing results show that some manufacturing sectors are much more sensitive than others and that imports can be as important as exports. Some metro areas may also have spurious correlations driven by some omitted variable. For these reasons a thorough understanding of why a particular metro area appears to be sensitive to the dollar can require case-by-case analysis and detailed local knowledge.

The importance of local knowledge and detailed industry information can be seen in Columbus GA-AL which is the third most negatively affected metro area. Columbus has a high concentration of employment in the insurance industry, which is negatively but not statistically significantly affected by a strong dollar. However, Columbus is the home of the insurance company Aflac, which has significant overseas operations and foreign exchange exposure. This is likely one factor contributing to the negative effect of the dollar on Columbus. This example also helps explain why the dollar has a mixed result on

finance, with varying effects that can be difficult to capture in an econometric model.

U.S. lessons

For the U.S., identifying whether an appreciating dollar is overall a net plus or minus for job growth is a difficult econometric

task. There are positive effects and negative effects, and an appreciating dollar is an outcome driven by factors including economic growth, interest rates and inflation, which also directly affect job growth. While the net effect of an appreciating dollar remains unclear, it is easier to say which metro areas

and industries tend to be helped or harmed. More globalized industries are more likely to be hurt, even if they do not export but compete with imports. Metro areas that depend on these globalized industries will tend to be hurt, however an older and higher-income population helps reduce these effects.

Appendix 1: Industries Most Affected by a Strong Dollar

Effect on annualized metro job growth of 15% appreciation in dollar, ppt

Rank	Industry	Effect	T-value
1	Pipeline transportation	-4.1	-4.4
2	Apparel and leather and allied products	-3.9	-5.8
3	Petroleum and coal products	-2.9	-5.3
4	Performing arts, spectator sports, museums, and related activities	-2.4	-2.5
5	Forestry, fishing, and related activities	-2.3	-1.4
6	Water transportation	-2.2	-2.0
7	Oil and gas extraction	-2.0	-3.1
8	Paper products	-1.4	-5.3
9	Transit and ground passenger transportation	-1.2	-1.4
10	Machinery	-1.2	-3.2
11	Primary metals	-1.1	-2.6
12	Textile mills and textile product mills	-1.0	-2.4
13	Funds, trusts, and other financial vehicles	-1.0	-0.7
14	Electrical equipment, appliances, and components	-1.0	-2.6
15	Printing and related support activities	-1.0	-3.6
16	Air transportation	-0.9	-1.0
17	Federal	-0.9	-0.9
18	Other transportation and support activities	-0.9	-1.4
19	Plastics and rubber products	-0.9	-2.4
20	Miscellaneous manufacturing	-0.8	-3.6
21	Support activities for mining	-0.8	-0.7
22	Food and beverage and tobacco products	-0.7	-2.6
23	Chemical products	-0.7	-3.2
24	Fabricated metal products	-0.5	-2.5
25	Ambulatory health care services	-0.5	-2.7
26	Management of companies and enterprises	-0.5	-2.1
27	Food and beverage stores	-0.5	-2.2
28	Computer and electronic products	-0.4	-1.3
29	Accommodation	-0.4	-0.9
30	Mining, except oil and gas	-0.4	-0.7
31	Miscellaneous professional, scientific, and technical services	-0.4	-1.8
32	Nursing and residential care facilities	-0.3	-1.8
33	Utilities	-0.3	-1.6
34	Publishing industries, except internet (includes software)	-0.3	-1.7
35	Insurance carriers and related activities	-0.3	-1.4
36	Other transportation equipment	-0.3	-0.7
37	Hospitals	-0.3	-2.4
38	Warehousing and storage	-0.2	-0.6
39	Broadcasting and telecommunications	-0.2	-0.4
40	Computer systems design and related services	-0.1	-0.2
41	Farms	-0.1	-1.1
42	Amusements, gambling, and recreation industries	-0.0	-0.1
43	Data processing, internet publishing, and other information services	-0.0	-0.1
44	Wholesale trade	0.1	0.4

Appendix 1: Industries Most Affected by a Strong Dollar (Cont.)

Effect on annualized metro job growth of 15% appreciation in dollar, ppt

Rank	Industry	Effect	T-value
45	Social assistance	0.1	0.2
46	Waste management and remediation services	0.1	0.3
47	Rental and leasing services and lessors of intangible assets	0.1	0.2
48	Securities, commodity contracts, and investments	0.2	0.2
49	Nonmetallic mineral products	0.2	0.6
50	Truck transportation	0.2	0.8
51	Motion picture and sound recording industries	0.2	0.2
52	General merchandise stores	0.2	0.6
53	Other services, except government	0.2	1.1
54	Furniture and related products	0.3	0.7
55	Food services and drinking places	0.3	1.4
56	Other real estate	0.4	2.0
57	Rail transportation	0.4	1.1
58	Administrative and support services	0.4	1.2
59	Other retail	0.5	3.0
60	Legal services	0.5	2.2
61	Educational services	0.6	1.3
62	Wood products	0.6	1.0
63	Motor vehicle and parts dealers	0.7	2.2
64	Federal Reserve banks, credit intermediation, and related activities	0.9	2.8
65	Motor vehicles, bodies and trailers, and parts	0.9	0.9
66	Construction	1.5	3.4

Sources: Moody's Analytics, BLS, BEA

Appendix 2: Metro Area Dollar Effects
Effect on annualized metro area job growth of 15% appreciation in dollar, ppt

Rank	Name	Effect on employment
1	Kokomo IN	-1.55
2	Cleveland TN	-1.07
3	Columbus GA-AL	-1.05
4	Muncie IN	-1.01
5	Odessa TX	-0.94
6	Grand Island NE	-0.92
7	Columbus IN	-0.90
8	Midland TX	-0.87
9	Colorado Springs CO	-0.86
10	San Angelo TX	-0.81
11	Lafayette-West Lafayette IN	-0.80
12	Sioux City IA-NE-SD	-0.80
13	Bay City MI	-0.79
14	Hickory-Lenoir-Morganton NC	-0.79
15	New Orleans-Metairie LA	-0.79
16	Lake Charles LA	-0.76
17	Gadsden AL	-0.75
18	Janesville-Beloit WI	-0.74
19	Florence-Muscle Shoals AL	-0.71
20	Spartanburg SC	-0.70
21	Bowling Green KY	-0.70
22	Burlington NC	-0.69
23	Lexington-Fayette KY	-0.67
24	Louisville/Jefferson County KY-IN	-0.65
25	Kingsport-Bristol-Bristol TN-VA	-0.65
26	Goldsboro NC	-0.62
27	Joplin MO	-0.62
28	Grand Rapids-Wyoming MI	-0.62
29	Springfield OH	-0.61
30	Kankakee IL	-0.60
31	Terre Haute IN	-0.60
32	Flint MI	-0.58
33	Niles-Benton Harbor MI	-0.56
34	Bismarck ND	-0.56
35	Jacksonville NC	-0.55
36	La Crosse-Onalaska WI-MN	-0.55
37	Manhattan KS	-0.54
38	Salt Lake City UT	-0.53
39	Austin-Round Rock TX	-0.52
40	Baton Rouge LA	-0.52
41	Macon GA	-0.51
42	Danville IL	-0.51
43	Rockford IL	-0.50
44	Mansfield OH	-0.50
45	Albany OR	-0.50
46	Sumter SC	-0.50
47	Fort Collins CO	-0.49
48	Jonesboro AR	-0.49
49	Killeen-Temple TX	-0.48
50	Greenville-Anderson-Mauldin SC	-0.48
51	Midland MI	-0.48
52	Appleton WI	-0.48

Rank	Name	Effect on employment
53	Mobile AL	-0.47
54	Corvallis OR	-0.47
55	Hammond LA	-0.46
56	Florence SC	-0.46
57	Yakima WA	-0.46
58	Bloomington IN	-0.46
59	El Paso TX	-0.45
60	Warren-Troy-Farmington Hills MI	-0.45
61	Owensboro KY	-0.44
62	Milwaukee-Waukesha-West Allis WI	-0.44
63	Cedar Rapids IA	-0.44
64	San Jose-Sunnyvale-Santa Clara CA	-0.44
65	Pocatello ID	-0.43
66	Fayetteville NC	-0.43
67	Durham-Chapel Hill NC	-0.43
68	Lincoln NE	-0.42
69	Portland-Vancouver-Hillsboro OR-WA	-0.42
70	Albany GA	-0.42
71	Grand Forks ND-MN	-0.41
72	Victoria TX	-0.41
73	Abilene TX	-0.41
74	Jackson TN	-0.41
75	Kansas City MO-KS	-0.41
76	Corpus Christi TX	-0.41
77	Gulfport-Biloxi-Pascagoula MS	-0.41
78	Michigan City-La Porte IN	-0.40
79	Chicago-Naperville-Arlington Heights IL	-0.40
80	Pueblo CO	-0.39
81	Jackson MI	-0.39
82	Winston-Salem NC	-0.39
83	Boulder CO	-0.38
84	Morristown TN	-0.38
85	San Antonio-New Braunfels TX	-0.37
86	Beckley WV	-0.36
87	Greensboro-High Point NC	-0.36
88	Nashville-Davidson--Murfreesboro--Franklin TN	-0.36
89	Rapid City SD	-0.35
90	Toledo OH	-0.35
91	Canton-Massillon OH	-0.35
92	Lubbock TX	-0.35
93	Fargo ND-MN	-0.35
94	Lewiston ID-WA	-0.34
95	Rocky Mount NC	-0.33
96	Saginaw MI	-0.33
97	South Bend-Mishawaka IN-MI	-0.33
98	Omaha-Council Bluffs NE-IA	-0.33
99	Hot Springs AR	-0.32
100	Provo-Orem UT	-0.31
101	Denver-Aurora-Lakewood CO	-0.31
102	Wenatchee WA	-0.30
103	Green Bay WI	-0.30
104	Oklahoma City OK	-0.30

Appendix 2: Metro Area Dollar Effects (Cont.)
Effect on annualized metro area job growth of 15% appreciation in dollar, ppt

Rank	Name	Effect on employment
105	Battle Creek MI	-0.29
106	Little Rock-North Little Rock-Conway AR	-0.29
107	Peoria IL	-0.29
108	Walla Walla WA	-0.29
109	Kalamazoo-Portage MI	-0.28
110	Oshkosh-Neenah WI	-0.28
111	Daphne-Fairhope-Foley AL	-0.28
112	Raleigh NC	-0.28
113	Sherman-Denison TX	-0.27
114	Racine WI	-0.27
115	San Francisco-Redwood City-South San Francisco	-0.27
116	Elmira NY	-0.27
117	Asheville NC	-0.26
118	Jefferson City MO	-0.26
119	Lafayette LA	-0.26
120	Cleveland-Elyria OH	-0.26
121	Shreveport-Bossier City LA	-0.25
122	Evansville IN-KY	-0.25
123	Birmingham-Hoover AL	-0.25
124	Gary IN	-0.25
125	Topeka KS	-0.24
126	Minneapolis-St. Paul-Bloomington MN-WI	-0.24
127	Decatur IL	-0.24
128	Atlanta-Sandy Springs-Roswell GA	-0.23
129	Akron OH	-0.23
130	Ogden-Clearfield UT	-0.23
131	Memphis TN-MS-AR	-0.23
132	Monroe LA	-0.22
133	New Bern NC	-0.22
134	Fond du Lac WI	-0.21
135	Waterloo-Cedar Falls IA	-0.21
136	Huntington-Ashland WV-KY-OH	-0.21
137	Duluth MN-WI	-0.20
138	Columbus OH	-0.20
139	Dayton OH	-0.20
140	Wichita Falls TX	-0.19
141	Lansing-East Lansing MI	-0.19
142	Williamsport PA	-0.19
143	Seattle-Bellevue-Everett WA	-0.19
144	Decatur AL	-0.19
145	Des Moines-West Des Moines IA	-0.19
146	Farmington NM	-0.19
147	Longview TX	-0.19
148	Rochester NY	-0.19
149	Tulsa OK	-0.18
150	Dallas-Plano-Irving TX	-0.18
151	Charlotte-Concord-Gastonia NC-SC	-0.18
152	College Station-Bryan TX	-0.18
153	Montgomery AL	-0.17
154	Reading PA	-0.17
155	Cambridge-Newton-Framingham MA	-0.17
156	Youngstown-Warren-Boardman OH-PA	-0.17

Rank	Name	Effect on employment
157	Detroit-Dearborn-Livonia MI	-0.17
158	Rockingham County-Strafford County NH	-0.17
159	Erie PA	-0.17
160	Dalton GA	-0.17
161	Gainesville GA	-0.17
162	Hagerstown-Martinsburg MD-WV	-0.16
163	Boise City ID	-0.16
164	Greeley CO	-0.16
165	Boston MA	-0.16
166	Columbia MO	-0.16
167	Fort Wayne IN	-0.16
168	Spokane-Spokane Valley WA	-0.15
169	Tuscaloosa AL	-0.15
170	Ames IA	-0.15
171	Davenport-Moline-Rock Island IA-IL	-0.15
172	Sioux Falls SD	-0.15
173	Fort Worth-Arlington TX	-0.14
174	Salem OR	-0.14
175	Waco TX	-0.13
176	Lawrence KS	-0.13
177	Indianapolis-Carmel-Anderson IN	-0.13
178	St. Cloud MN	-0.12
179	Roanoke VA	-0.12
180	Worcester MA-CT	-0.12
181	Charleston WV	-0.12
182	Madison WI	-0.12
183	Wichita KS	-0.12
184	Dubuque IA	-0.12
185	Amarillo TX	-0.11
186	Elgin IL	-0.11
187	Athens-Clarke County GA	-0.11
188	Dothan AL	-0.10
189	Beaumont-Port Arthur TX	-0.10
190	Springfield MO	-0.10
191	Greenville NC	-0.10
192	Longview WA	-0.09
193	Fort Smith AR-OK	-0.08
194	Bloomington IL	-0.08
195	Sheboygan WI	-0.08
196	Houston-The Woodlands-Sugar Land TX	-0.08
197	Springfield IL	-0.08
198	Clarksville TN-KY	-0.07
199	Albuquerque NM	-0.07
200	Mankato-North Mankato MN	-0.06
201	Lake County-Kenosha County IL-WI	-0.06
202	San Rafael CA	-0.05
203	Jackson MS	-0.05
204	State College PA	-0.04
205	Lynchburg VA	-0.04
206	Cape Girardeau MO-IL	-0.03
207	Miami-Miami Beach-Kendall FL	-0.03
208	Columbia SC	-0.03

Appendix 2: Metro Area Dollar Effects (Cont.)
Effect on annualized metro area job growth of 15% appreciation in dollar, ppt

Rank	Name	Effect on employment
209	Eau Claire WI	-0.03
210	Wilmington NC	-0.02
211	Harrisburg-Carlisle PA	-0.02
212	Tallahassee FL	-0.02
213	Knoxville TN	-0.02
214	Johnstown PA	-0.01
215	St. Louis MO-IL	0.00
216	Pittsburgh PA	0.00
217	Cincinnati OH-KY-IN	0.01
218	Parkersburg-Vienna WV	0.01
219	New York-Jersey City-White Plains NY-NJ	0.01
220	Manchester-Nashua NH	0.01
221	Buffalo-Cheektowaga-Niagara Falls NY	0.02
222	Chattanooga TN-GA	0.03
223	Rome GA	0.03
224	Tacoma-Lakewood WA	0.03
225	Tucson AZ	0.03
226	Burlington-South Burlington VT	0.04
227	Prescott AZ	0.05
228	Santa Fe NM	0.05
229	Eugene OR	0.05
230	Bridgeport-Stamford-Norwalk CT	0.05
231	Wheeling WV-OH	0.05
232	Staunton-Waynesboro VA	0.05
233	Johnson City TN	0.06
234	Carbondale-Marion IL	0.06
235	Orlando-Kissimmee-Sanford FL	0.07
236	Houma-Thibodaux LA	0.07
237	Hattiesburg MS	0.07
238	Pine Bluff AR	0.07
239	Wausau WI	0.07
240	Great Falls MT	0.08
241	Brownsville-Harlingen TX	0.08
242	Logan UT-ID	0.08
243	Wilmington DE-MD-NJ	0.08
244	Savannah GA	0.08
245	Scranton--Wilkes-Barre--Hazleton PA	0.08
246	Richmond VA	0.09
247	Huntsville AL	0.09
248	Cheyenne WY	0.09
249	Santa Cruz-Watsonville CA	0.11
250	West Palm Beach-Boca Raton-Delray Beach FL	0.11
251	Fayetteville-Springdale-Rogers AR-MO	0.11
252	Harrisonburg VA	0.12
253	Alexandria LA	0.12
254	York-Hanover PA	0.12
255	Tyler TX	0.12
256	Medford OR	0.12
257	Springfield MA	0.12
258	Olympia-Tumwater WA	0.12
259	Blacksburg-Christiansburg-Radford VA	0.12
260	Pensacola-Ferry Pass-Brent FL	0.12

Rank	Name	Effect on employment
261	Elkhart-Goshen IN	0.12
262	Myrtle Beach-Conway-North Myrtle Beach SC-NC	0.12
263	Coeur d'Alene ID	0.13
264	Oakland-Hayward-Berkeley CA	0.13
265	Montgomery County-Bucks County-Chester	0.13
266	Norwich-New London CT	0.13
267	Billings MT	0.14
268	Champaign-Urbana IL	0.14
269	Gainesville FL	0.14
270	Jacksonville FL	0.15
271	Flagstaff AZ	0.15
272	Weirton-Steubenville WV-OH	0.16
273	Tampa-St. Petersburg-Clearwater FL	0.17
274	Binghamton NY	0.17
275	Albany-Schenectady-Troy NY	0.17
276	Charlottesville VA	0.17
277	Valdosta GA	0.17
278	Missoula MT	0.19
279	Fort Lauderdale-Pompano Beach-Deerfield Beach	0.19
280	Grand Junction CO	0.19
281	Kennewick-Richland WA	0.19
282	Iowa City IA	0.20
283	Chambersburg-Waynesboro PA	0.20
284	Laredo TX	0.20
285	Grants Pass OR	0.21
286	Utica-Rome NY	0.21
287	Lawton OK	0.21
288	Auburn-Opelika AL	0.21
289	Hinesville GA	0.21
290	Philadelphia PA	0.21
291	St. Joseph MO-KS	0.21
292	Santa Rosa CA	0.22
293	Elizabethtown-Fort Knox KY	0.22
294	Anchorage AK	0.23
295	Phoenix-Mesa-Scottsdale AZ	0.23
296	Texarkana TX-AR	0.24
297	St. George UT	0.24
298	Anniston-Oxford-Jacksonville AL	0.24
299	Altoona PA	0.24
300	Monroe MI	0.24
301	Syracuse NY	0.25
302	Augusta-Richmond County GA-SC	0.25
303	Providence-Warwick RI-MA	0.25
304	Barnstable Town MA	0.25
305	Brunswick GA	0.26
306	Lancaster PA	0.26
307	Reno NV	0.27
308	Cape Coral-Fort Myers FL	0.28
309	Salinas CA	0.28
310	Panama City FL	0.28
311	Rochester MN	0.28
312	El Centro CA	0.29

Appendix 2: Metro Area Dollar Effects (Cont.)

Effect on annualized metro area job growth of 15% appreciation in dollar, ppt

Rank	Name	Effect on employment
313	Fairbanks AK	0.29
314	Ann Arbor MI	0.30
315	Bangor ME	0.30
316	Morgantown WV	0.30
317	Pittsfield MA	0.31
318	Ocala FL	0.32
319	Muskegon MI	0.32
320	Hartford-West Hartford-East Hartford CT	0.32
321	Mount Vernon-Anacortes WA	0.33
322	North Port-Sarasota-Bradenton FL	0.33
323	Allentown-Bethlehem-Easton PA-NJ	0.33
324	Los Angeles-Long Beach-Glendale CA	0.33
325	Deltona-Daytona Beach-Ormond Beach FL	0.33
326	Lewiston-Auburn ME	0.34
327	Portland-South Portland ME	0.34
328	Lima OH	0.34
329	Glens Falls NY	0.36
330	Urban Honolulu HI	0.37
331	Warner Robins GA	0.37
332	Napa CA	0.38
333	Bloomsburg-Berwick PA	0.40
334	California-Lexington Park MD	0.40
335	Merced CA	0.40
336	Fresno CA	0.41
337	Baltimore-Columbia-Towson MD	0.41
338	Carson City NV	0.41
339	Nassau County-Suffolk County NY	0.41
340	Kahului-Wailuku-Lahaina HI	0.41
341	Dover DE	0.42
342	Chico CA	0.42
343	Lakeland-Winter Haven FL	0.44
344	Washington-Arlington-Alexandria DC-VA-MD-WV	0.44
345	Ithaca NY	0.46
346	Stockton-Lodi CA	0.47
347	Virginia Beach-Norfolk-Newport News VA-NC	0.47
348	Charleston-North Charleston SC	0.47
349	Gettysburg PA	0.47
350	Casper WY	0.48
351	Bend-Redmond OR	0.49
352	Crestview-Fort Walton Beach-Destin FL	0.49
353	Bellingham WA	0.50
354	New Haven-Milford CT	0.50
355	San Diego-Carlsbad CA	0.51
356	Modesto CA	0.51
357	Newark NJ-PA	0.52

Rank	Name	Effect on employment
358	Las Vegas-Henderson-Paradise NV	0.52
359	Ocean City NJ	0.52
360	Anaheim-Santa Ana-Irvine CA	0.53
361	Yuma AZ	0.55
362	Silver Spring-Frederick-Rockville MD	0.55
363	Santa Maria-Santa Barbara CA	0.57
364	Trenton NJ	0.58
365	Bremerton-Silverdale WA	0.58
366	Sierra Vista-Douglas AZ	0.58
367	Vallejo-Fairfield CA	0.59
368	Camden NJ	0.59
369	Visalia-Porterville CA	0.59
370	Watertown-Fort Drum NY	0.60
371	Redding CA	0.60
372	Salisbury MD-DE	0.63
373	Sacramento--Roseville--Arden-Arcade CA	0.64
374	Lebanon PA	0.64
375	Idaho Falls ID	0.65
376	Winchester VA-WV	0.66
377	Las Cruces NM	0.67
378	Port St. Lucie FL	0.68
379	McAllen-Edinburg-Mission TX	0.69
380	San Luis Obispo-Paso Robles-Arroyo Grande CA	0.70
381	Palm Bay-Melbourne-Titusville FL	0.71
382	Atlantic City-Hammonton NJ	0.71
383	Riverside-San Bernardino-Ontario CA	0.71
384	Cumberland MD-WV	0.72
385	Hanford-Corcoran CA	0.72
386	Madera CA	0.75
387	Bakersfield CA	0.80
388	Hilton Head Island-Bluffton-Beaufort SC	0.80
389	Oxnard-Thousand Oaks-Ventura CA	0.83
390	Yuba City CA	0.87
391	Naples-Immokalee-Marco Island FL	0.88
392	Punta Gorda FL	0.92
393	Sebastian-Vero Beach FL	1.08
394	Kingston NY	1.08
395	Vineland-Bridgeton NJ	1.10
396	Dutchess County-Putnam County NY	1.11
397	Lake Havasu City-Kingman AZ	1.19
398	Sebring FL	1.35
399	East Stroudsburg PA	1.36
400	The Villages FL	1.62
401	Homosassa Springs FL	1.71

Source: Moody's Analytics

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