

## **Assessing the Relationship Between Online Job Postings and Total Hires and Education Levels in Arizona**

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## Help Wanted Online (HWOL)

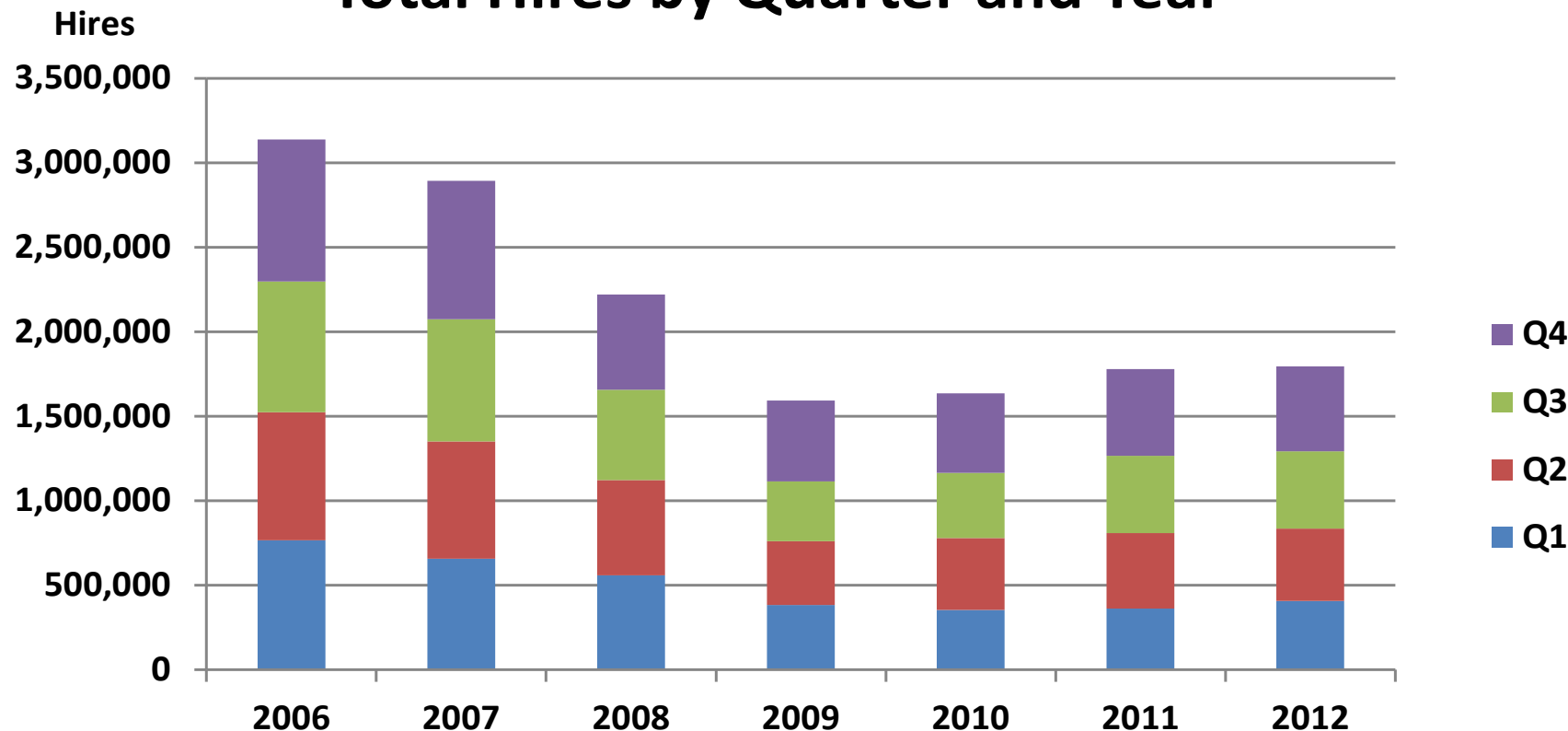
- HWOL data series from the Conference Board primarily consists of online job postings by occupation
- These job postings are compiled from internet job boards, company websites, and newspapers using spidering technology Examples of websites:
  - Monster
  - CareerBuilder
  - Employer Job Boards
  - Government Job Boards
- Postings collected at regular frequency and de-duplication logic applied. Continuously updated
- Data are parsed to produce information on hiring requirements including education, experience, skills, and certifications
- A useful resource to assess current online job posting trends, new and emerging occupations, and their skill requirements
- Geographically comprehensive (State, MSA, County)

## Longitudinal Employment Dynamics

- Provides labor market information (LMI) statistics by industry
- LMI data collected from establishment universe quarterly
- Unemployment insurance covered employment and wages by industry
- Worker demographics collected includes age, sex, race, ethnicity, educational attainment, and place of residence
- Variety of data sources used for worker demographics such as, administrative records, Social Security data, Federal tax records, and other census and survey data
- Six month lag in the data

Hiring activity in Arizona gradually picking up post-recession

## Total Hires by Quarter and Year

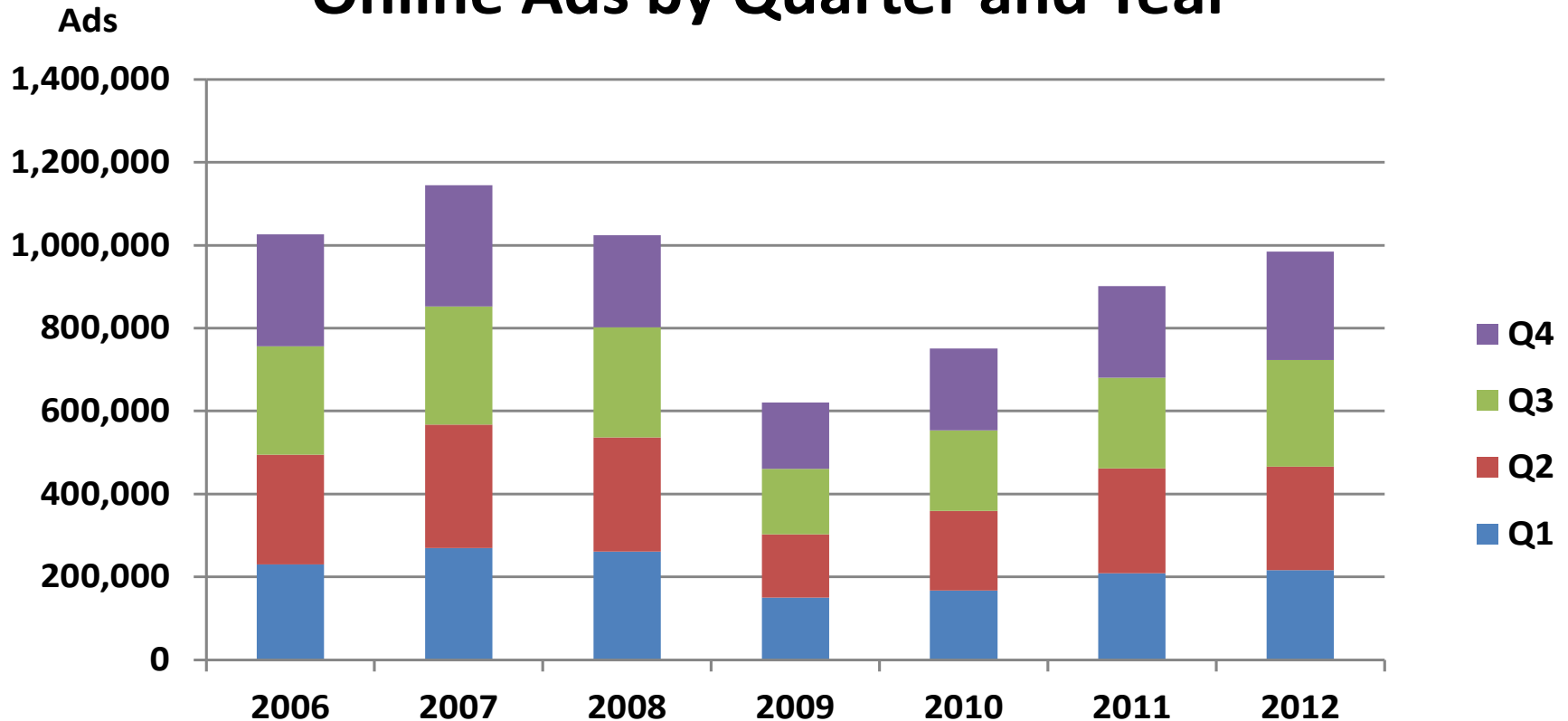


Source: U.S. Census Bureau; Local Employment-Household Dynamics program

\*Total hires measures total accessions, i.e., new hires plus recalls

Online Ad postings picking up at a faster pace than total hires post-recession

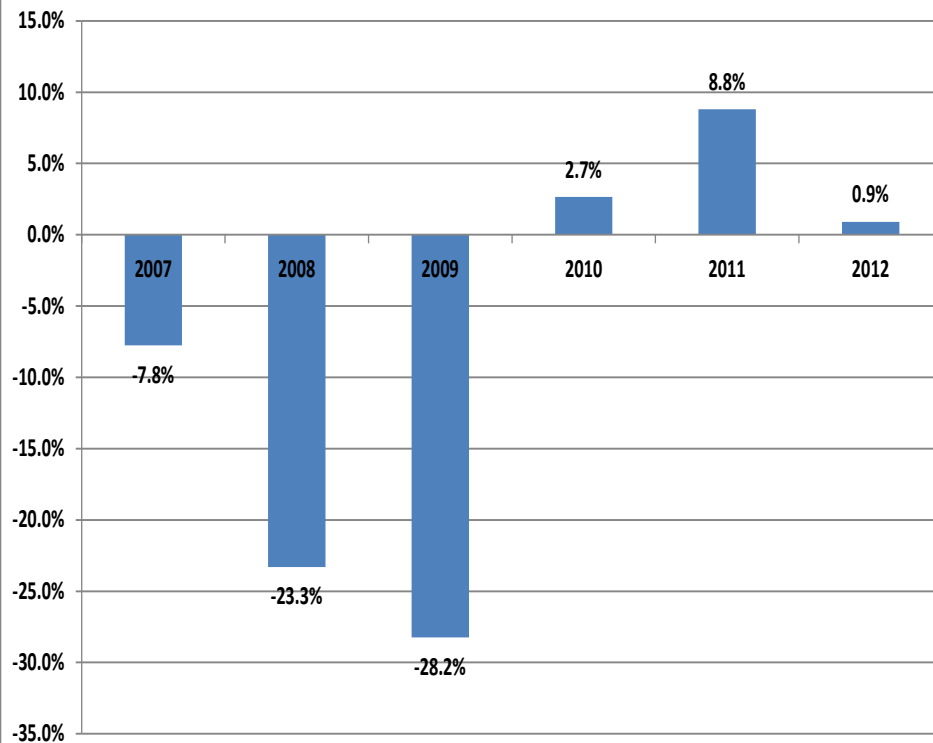
## Online Ads by Quarter and Year



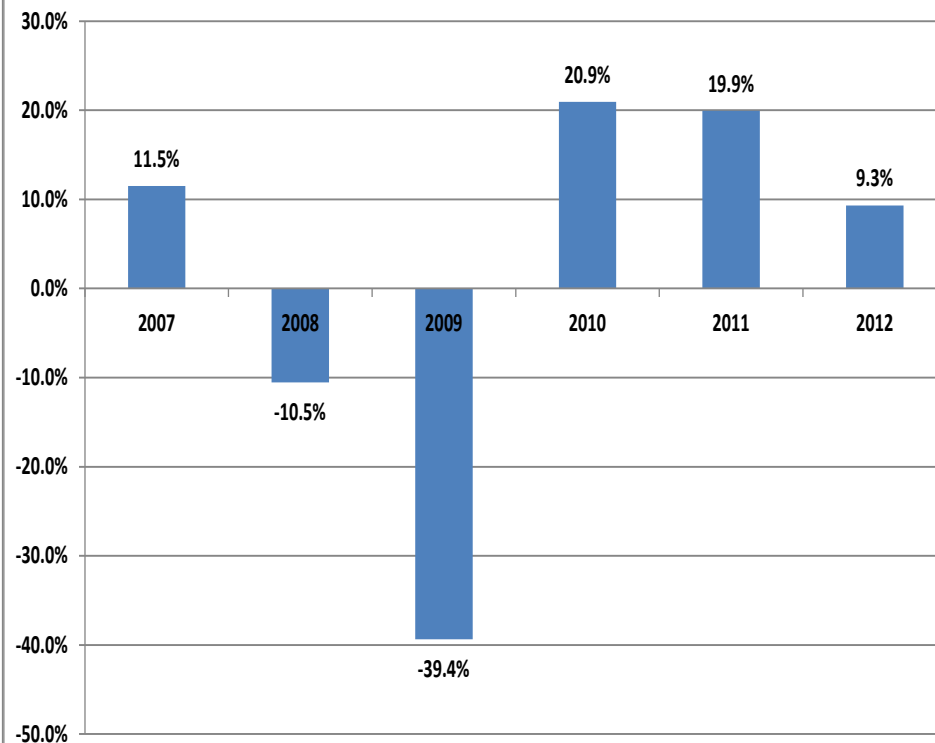
Source: Conference Board; Help Wanted Online Data Series

## Over-the-year growth in online ads outpaced total hires

### Over-The-Year Percent Change in Total Hires



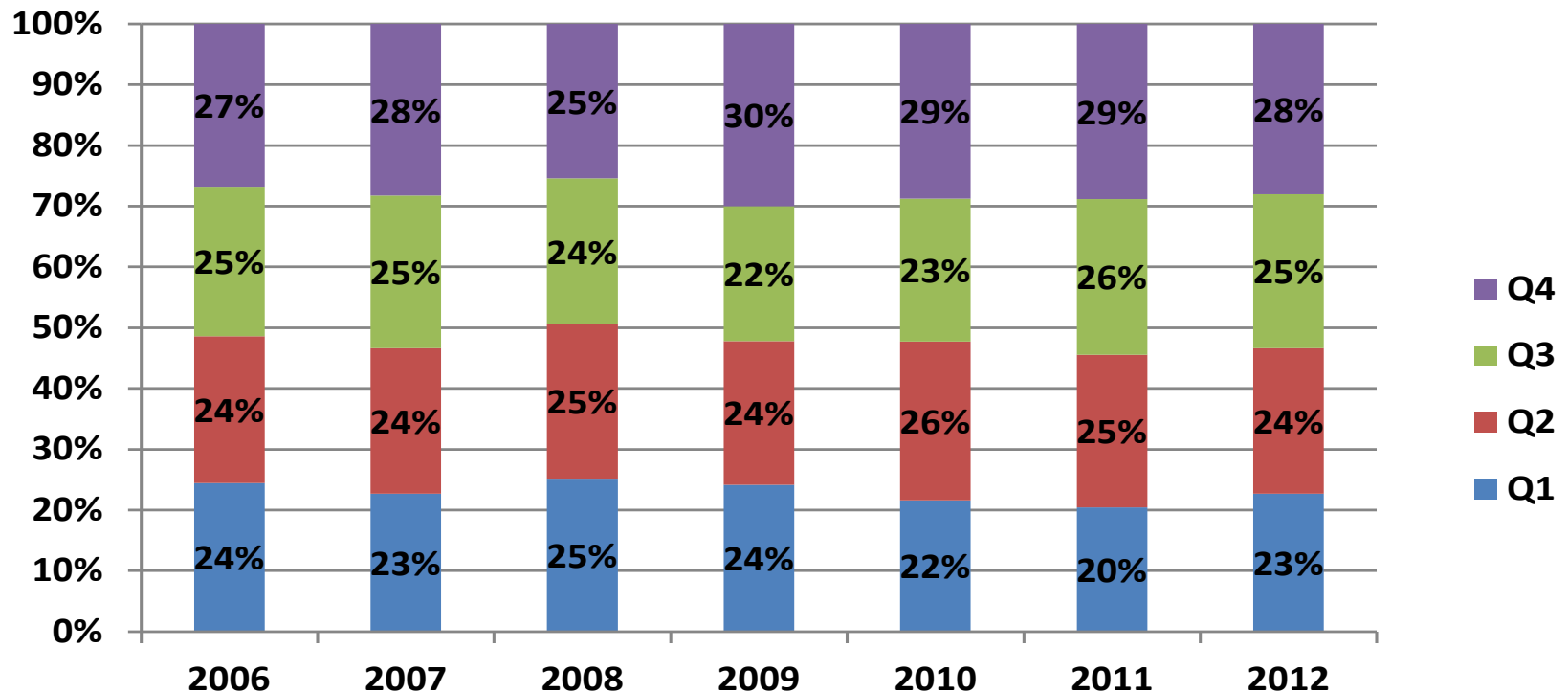
### Over-The-Year Percent Change in Online Ads



Arizona Hiring activity greater in 4<sup>th</sup> quarter and lowest in the 1<sup>st</sup> quarter

## Percent Total Hires by Quarter and Year

Percent Hires

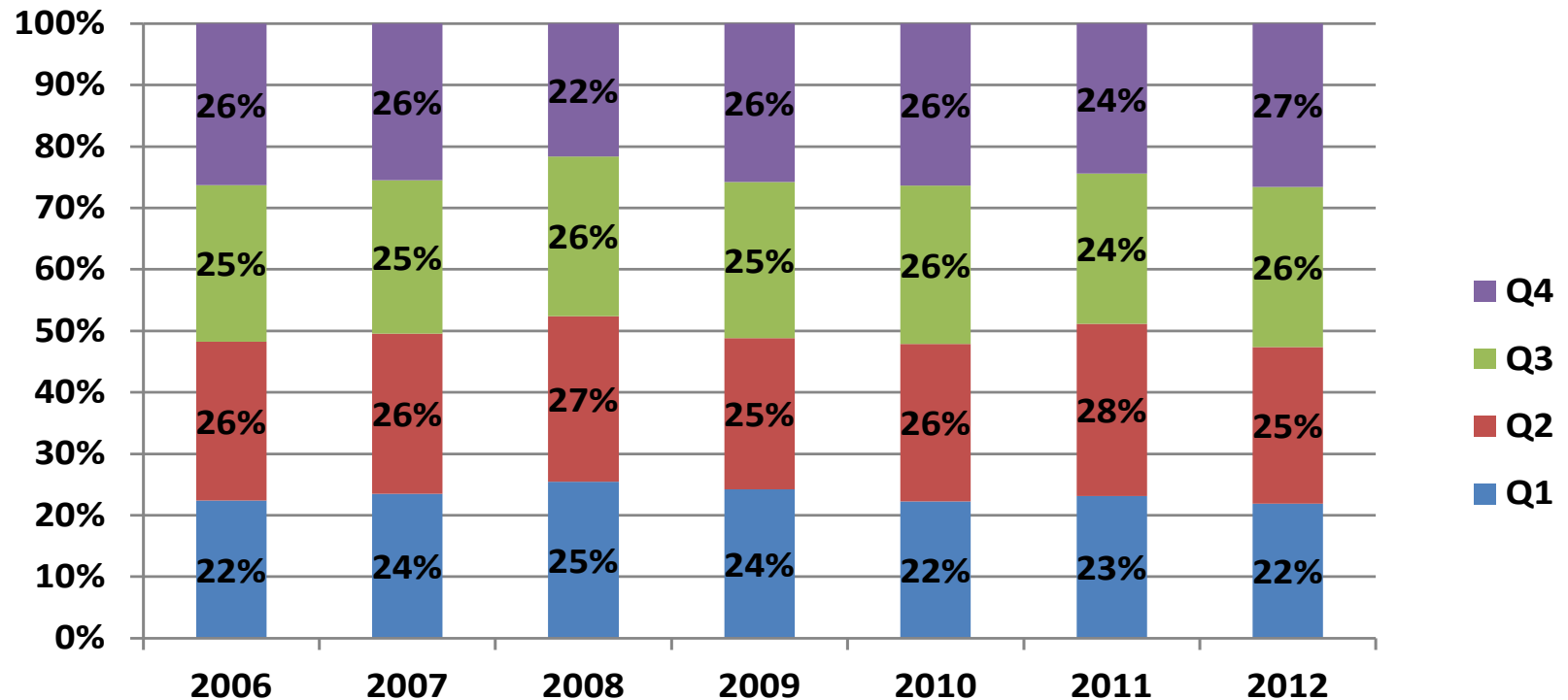


Source: U.S. Census Bureau; Local Employment-Household Dynamics program

Fewer Ads in the 1<sup>st</sup> quarter compared to the rest of the year

## Percent Online Ads by Quarter and Year

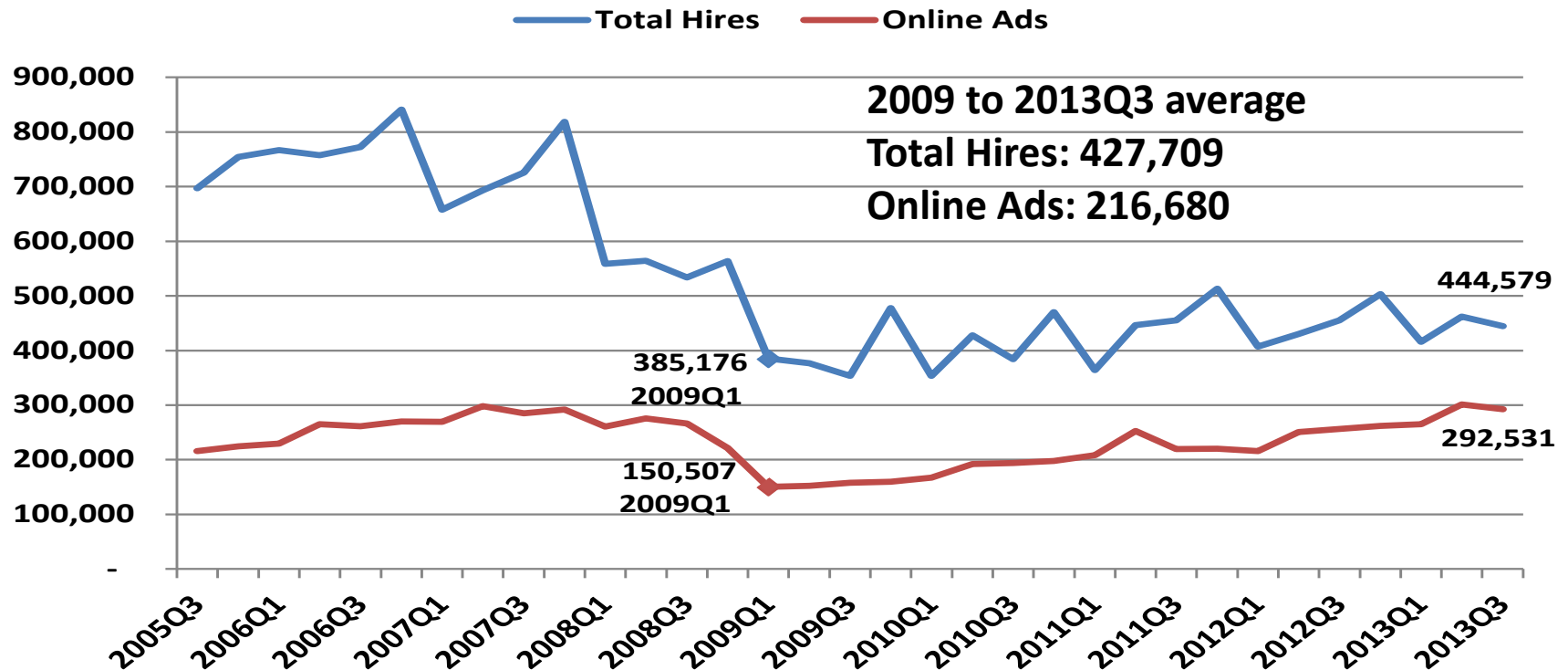
Percent Ads



Source: U.S. Census Bureau; Local Employment-Household Dynamics program

From 2009 to 2013Q3 Online Ads accounted for roughly half the hires

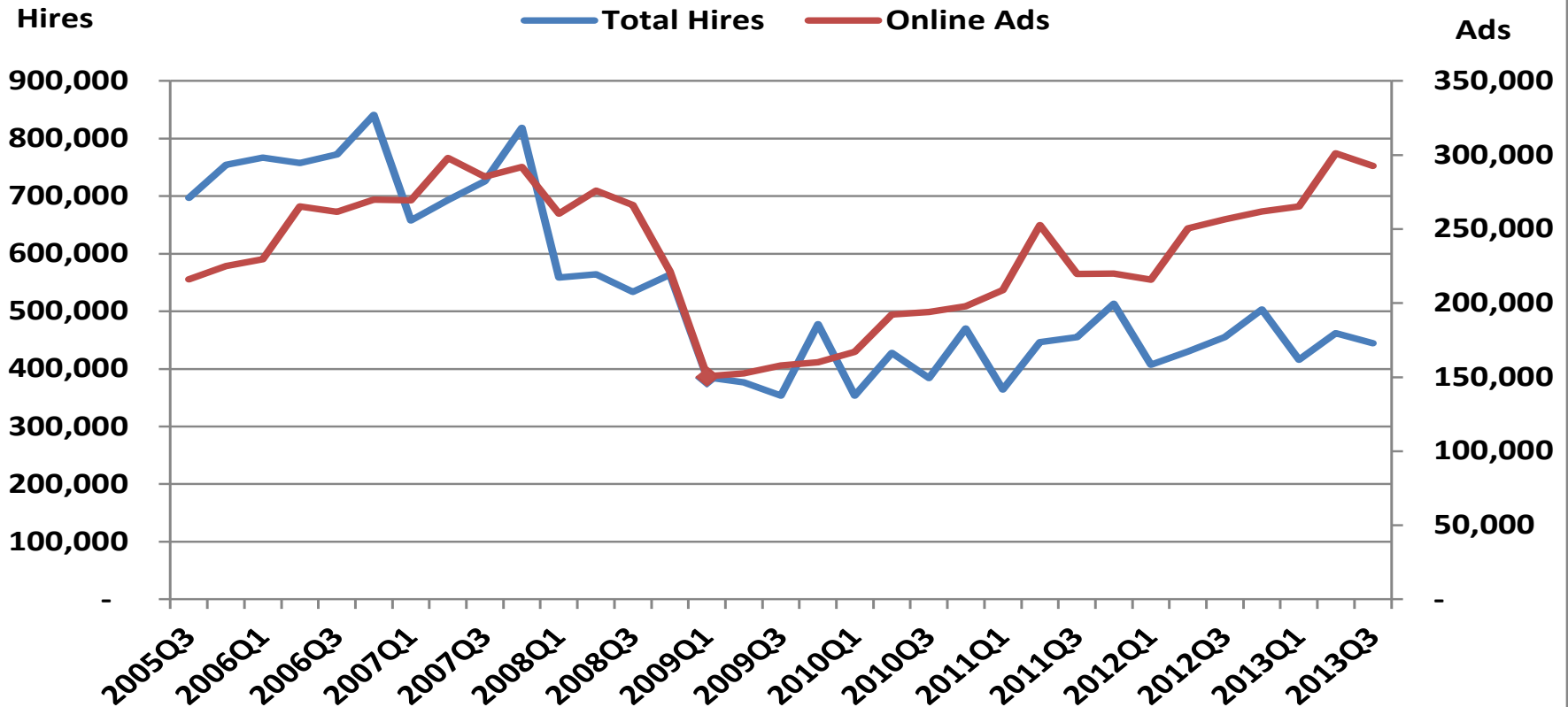
## Total Hires Greater Than Online Ads



Source: U.S. Census Bureau; Local Employment-Household Dynamics program  
Conference Board; Help Wanted Online Data Series



## Total Hires Greater Than Online Ads



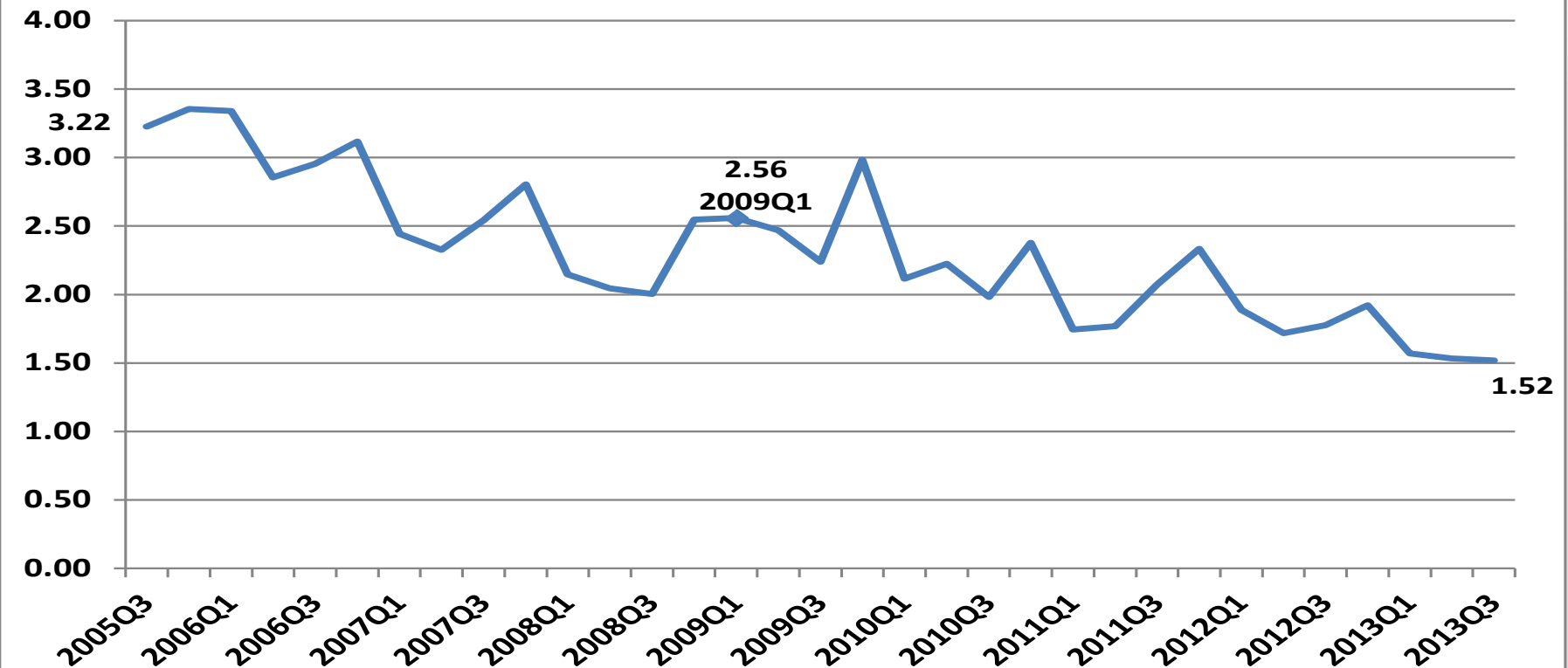
Source: U.S. Census Bureau; Local Employment-Household Dynamics program  
Conference Board; Help Wanted Online Data Series

# Employment and Population Statistics

Greater internet access, fluency, and familiarity, possible improvement in deduplication logic, reduced cost, etc. may be contributing to the declining ratio

## Number of Hires Per Online Ad

Hires/Ads Ratio

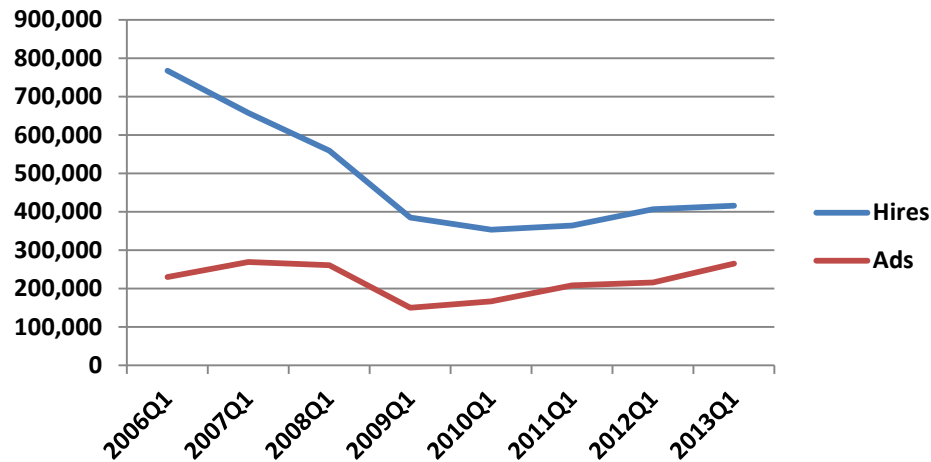


Source: U.S. Census Bureau; Local Employment-Household Dynamics program  
Conference Board; Help Wanted Online Data Series

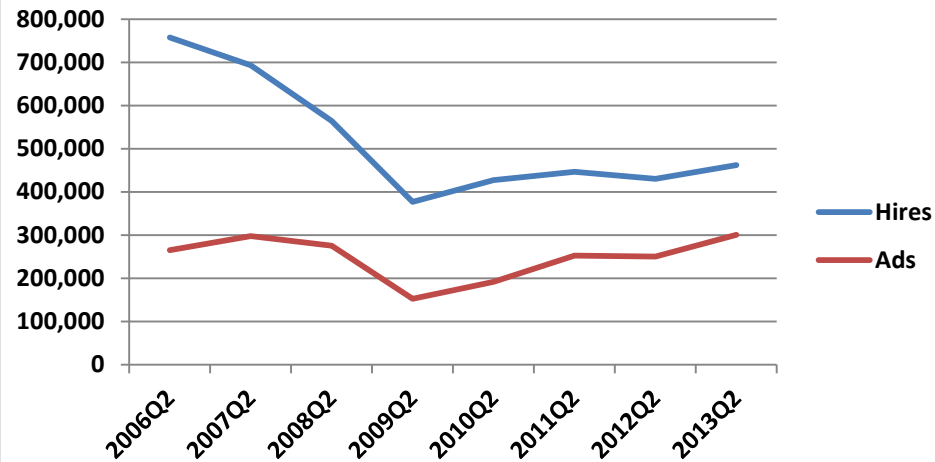
# Employment and Population Statistics

**Largest gap between hires and online ads in the 4<sup>th</sup> quarter most likely due to a higher concentration of seasonal hires not necessarily requiring an online ad**

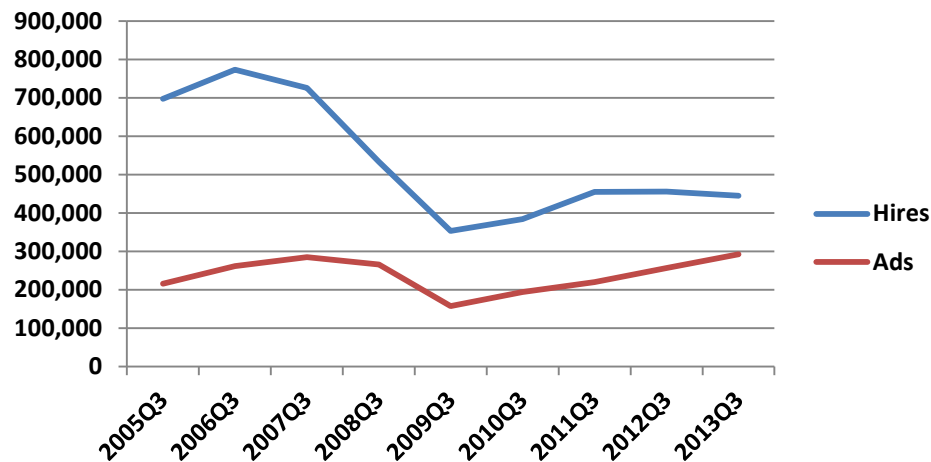
## Quarter 1 Snapshot



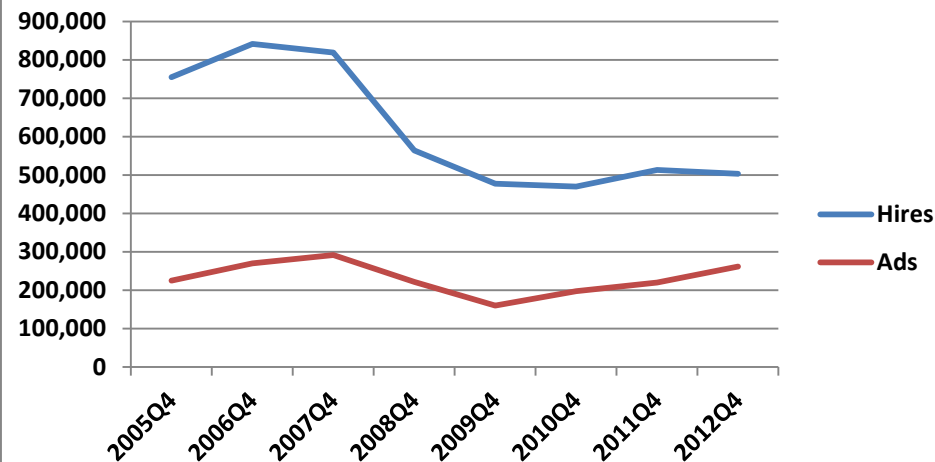
## Quarter 2 Snapshot



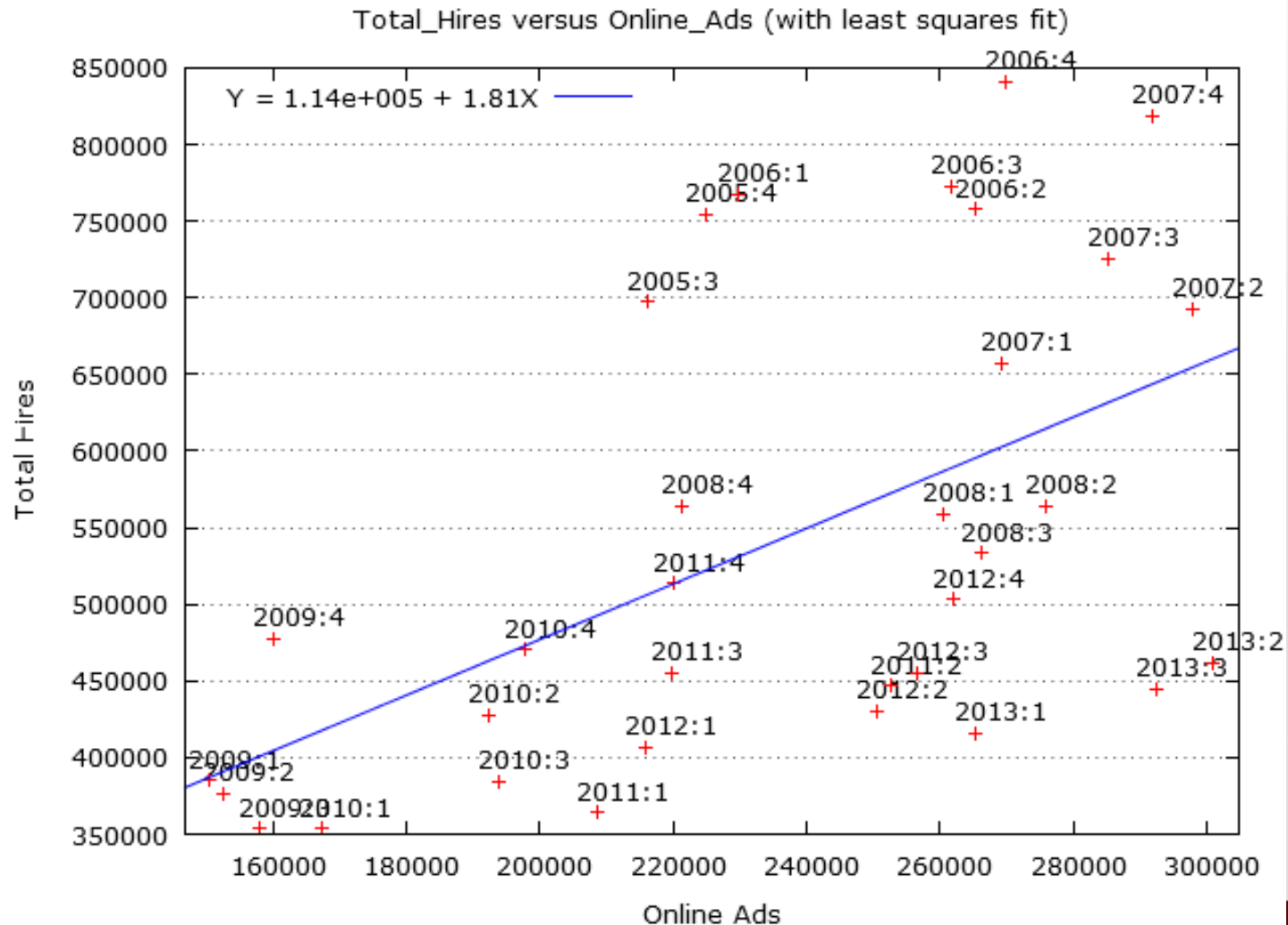
## Quarter 3 Snapshot



## Quarter 4 Snapshot



## Scatter plot of total hires Vs online Ads



## Do Online Job Ads Predict Hiring?

Cochrane-Orcutt, using observations 2005:4-2013:3 (T = 32)

Dependent variable: Total\_Hires

rho = 0.80576

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	96948.2	161214	0.6014	0.55212	
Online_Ads	1.65327	0.592218	2.7916	0.00904	***

Statistics based on the rho-differenced data:

Mean dependent var	535450.0	S.D. dependent var	152616.2
Sum squared resid	1.76e+11	S.E. of regression	76626.07
R-squared	0.756079	Adjusted R-squared	0.747948
F(1, 30)	7.793301	P-value(F)	0.009036
rho	-0.252095	Durbin-Watson	2.450793

$$\text{Total Hires} = 96,948.2 + 1.65327 \text{ Online Ads} + e$$

## Education Categories

### Local Employment Household Dynamics

#### Five educational sub-categories:

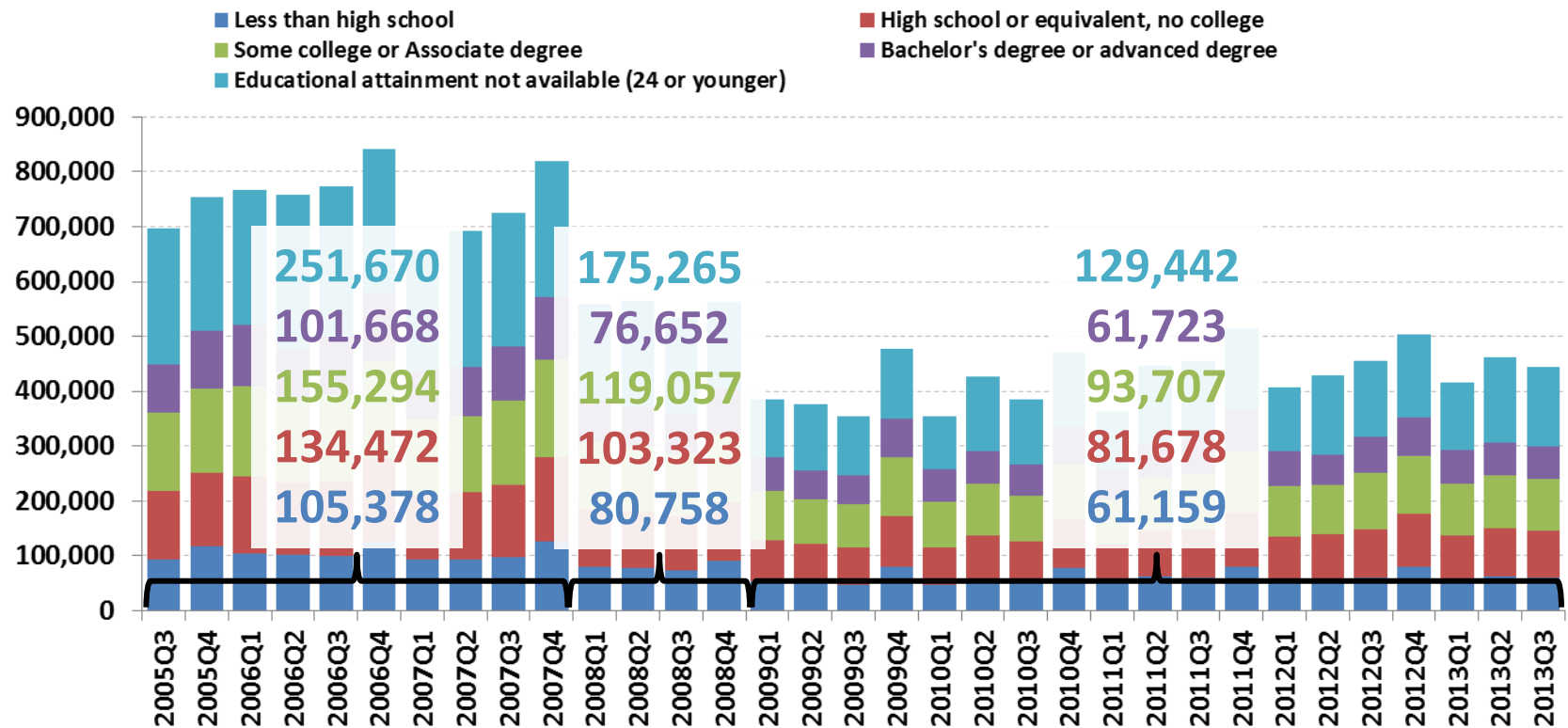
- Less than high school
- High school or equivalent, no college
- Some college or Associate degree
- Bachelor's degree or advanced degree
- Educational attainment not available (workers aged 24 or younger)

### Help Wanted Online

#### Eight educational sub-categories:

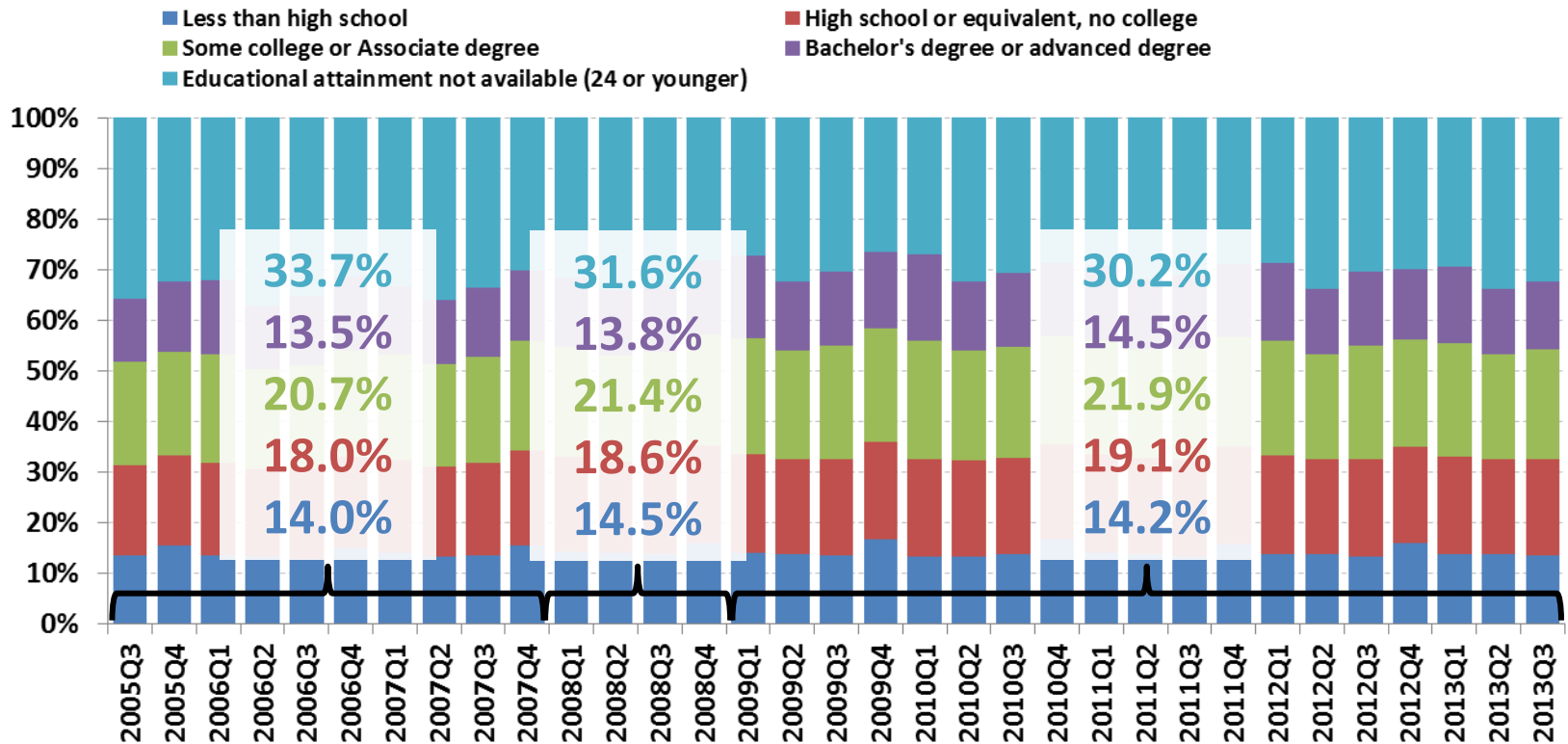
- Less than high school
- High school diploma or equivalent
- Some college, no degree
- Postsecondary non-degree award
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctoral or professional degree

## All Hires by Education Category



Source: U.S. Census Bureau; Local Employment-Household Dynamics program

## Proportion of All Hires by Education Category

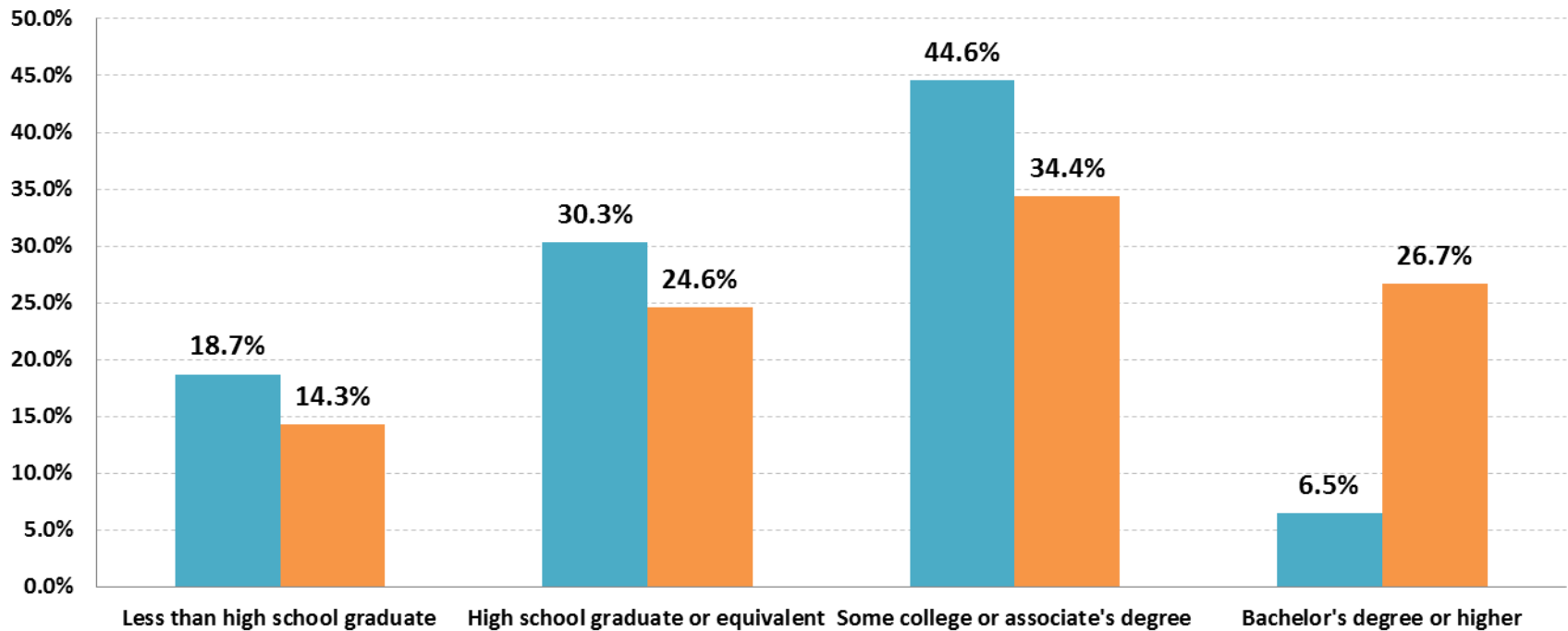


Source: U.S. Census Bureau; Local Employment-Household Dynamics program



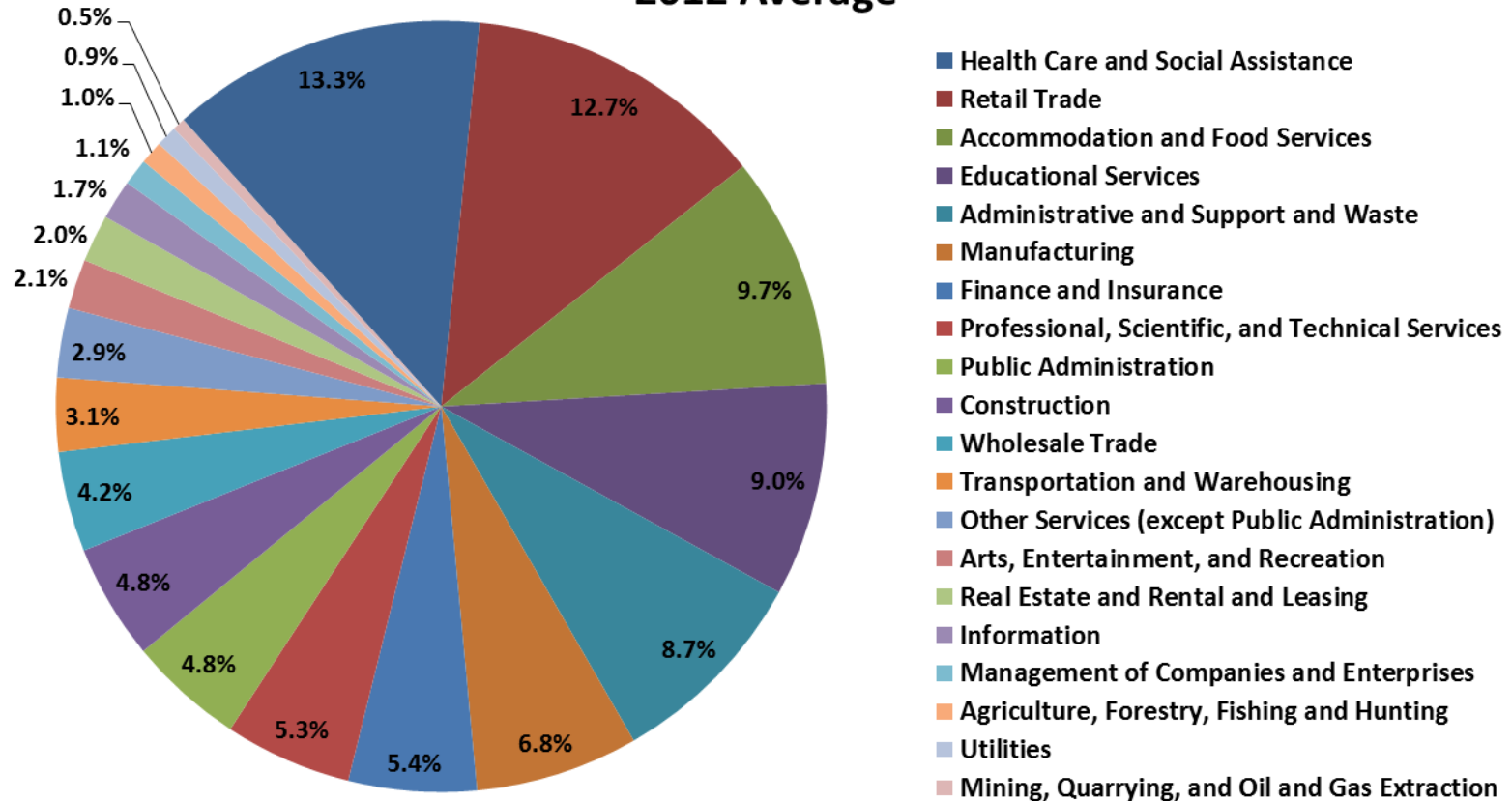
## Educational Attainment by Age 2012 ACS 3-year estimates

■ Population 18 to 24 years    ■ Population 25 years and over



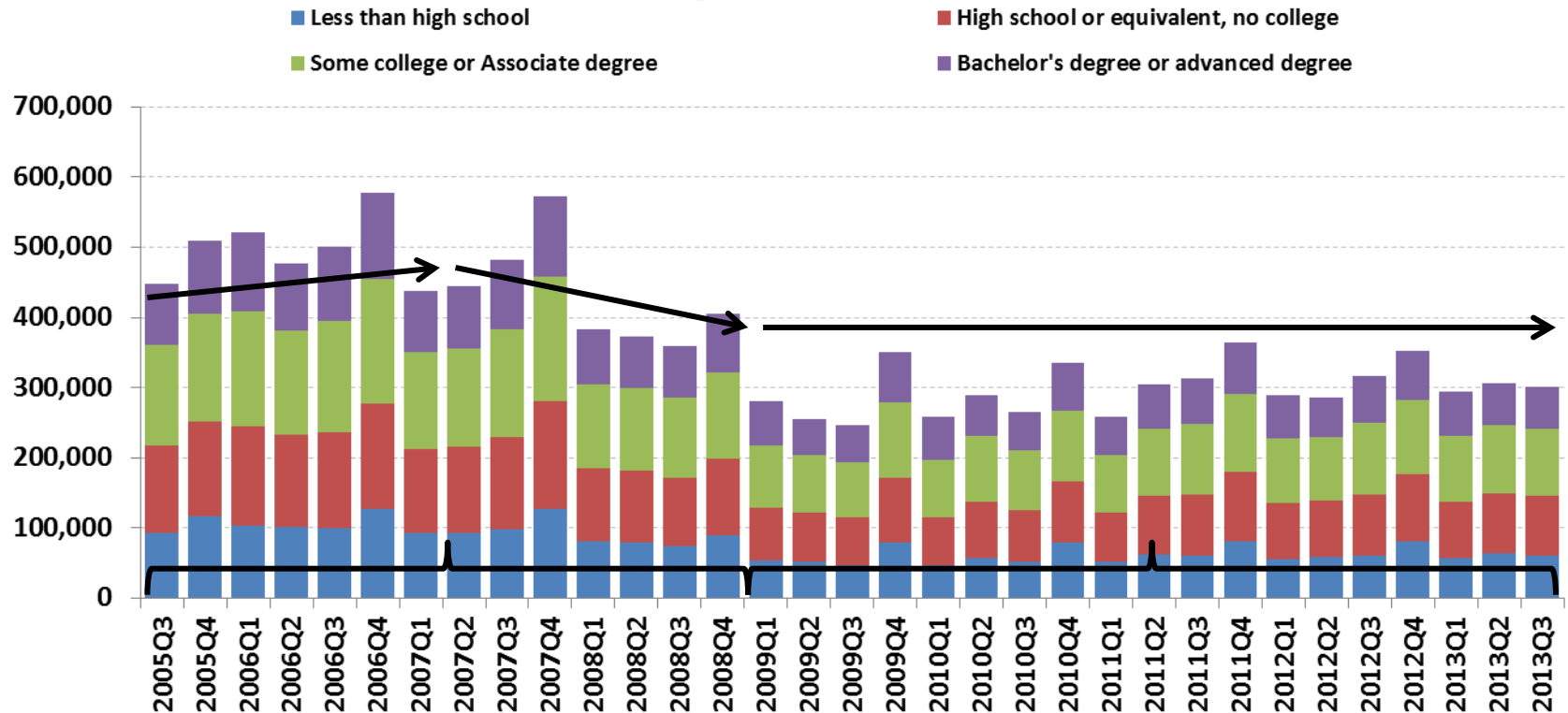
Source: U.S. Census Bureau, American Community Survey

## Begining of Quarter Employment Share (LEHD) 2012 Average



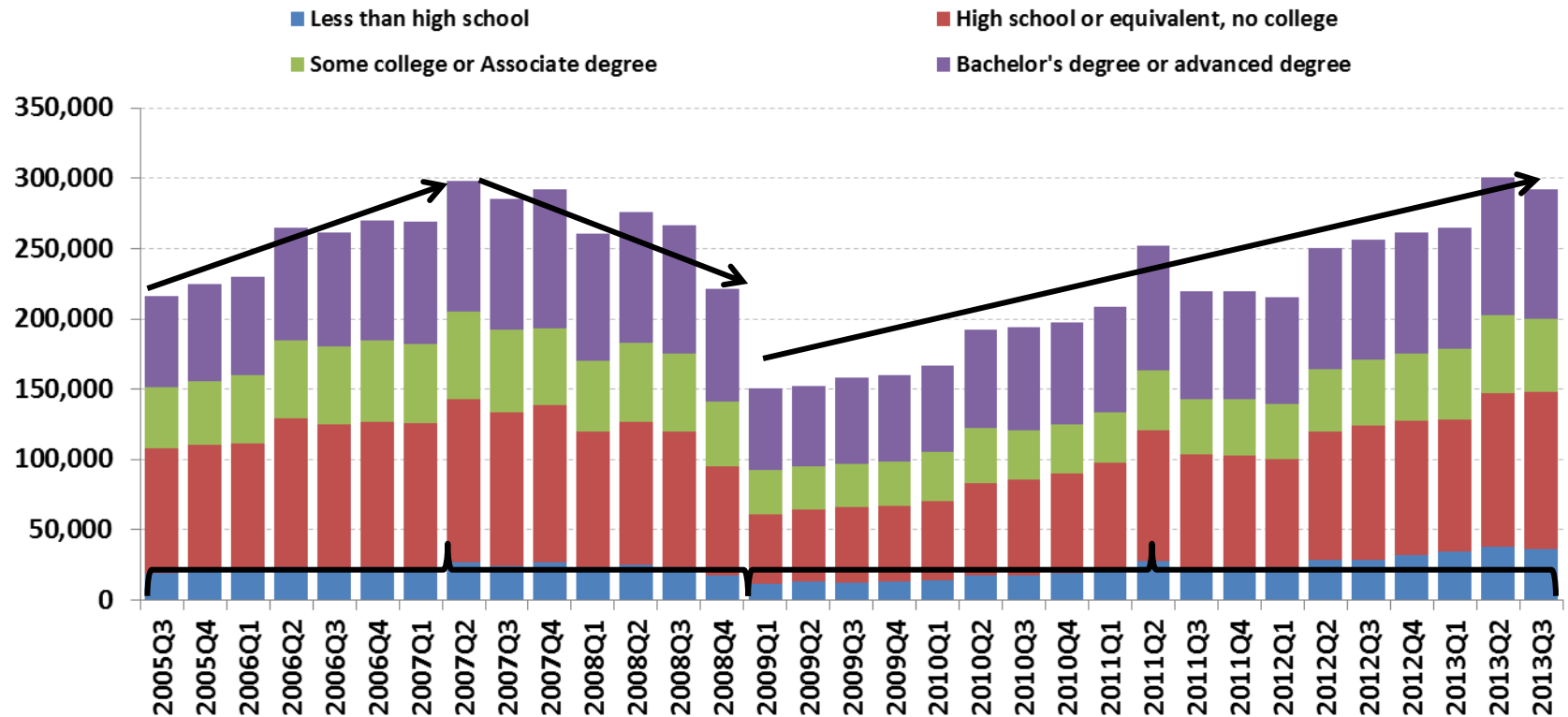
## All Hires by Education Category

Aged 25 and Older



Source: U.S. Census Bureau; Local Employment-Houshold Dynamics program

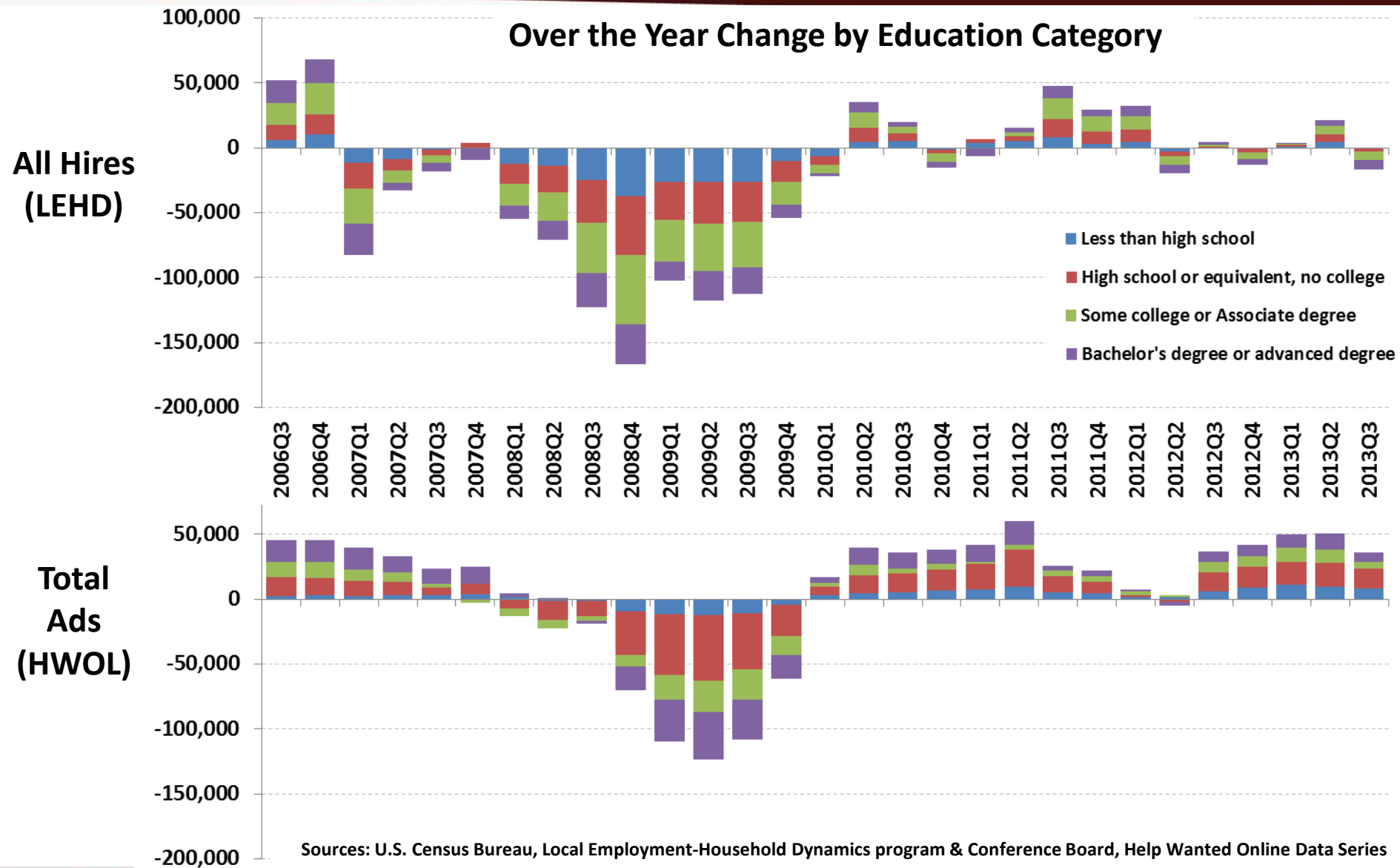
## Total Ads by Education Category



Source: Conference Board, Help Wanted Online Data Series

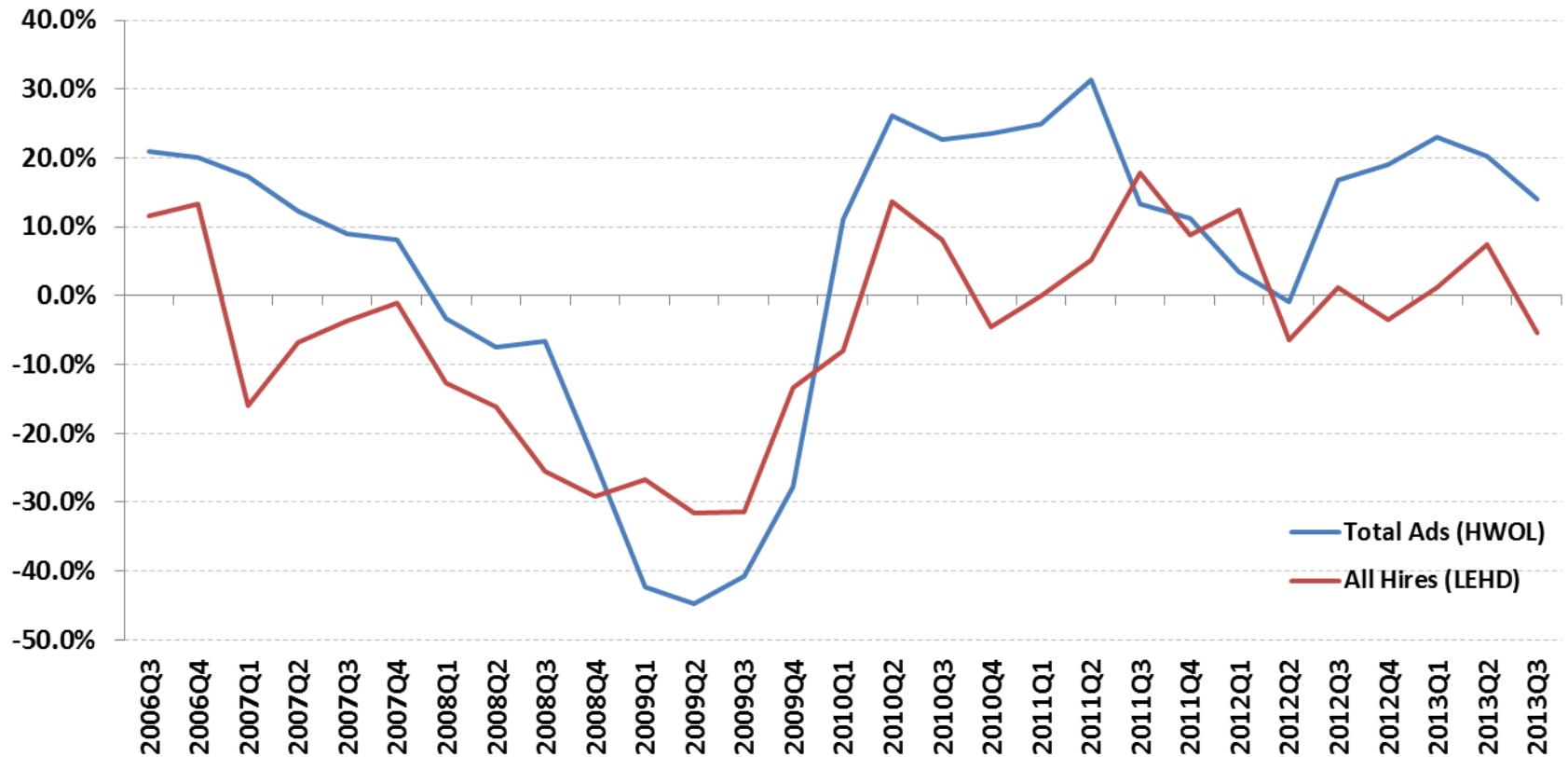
# Employment and Population Statistics

## Over the Year Change by Education Category



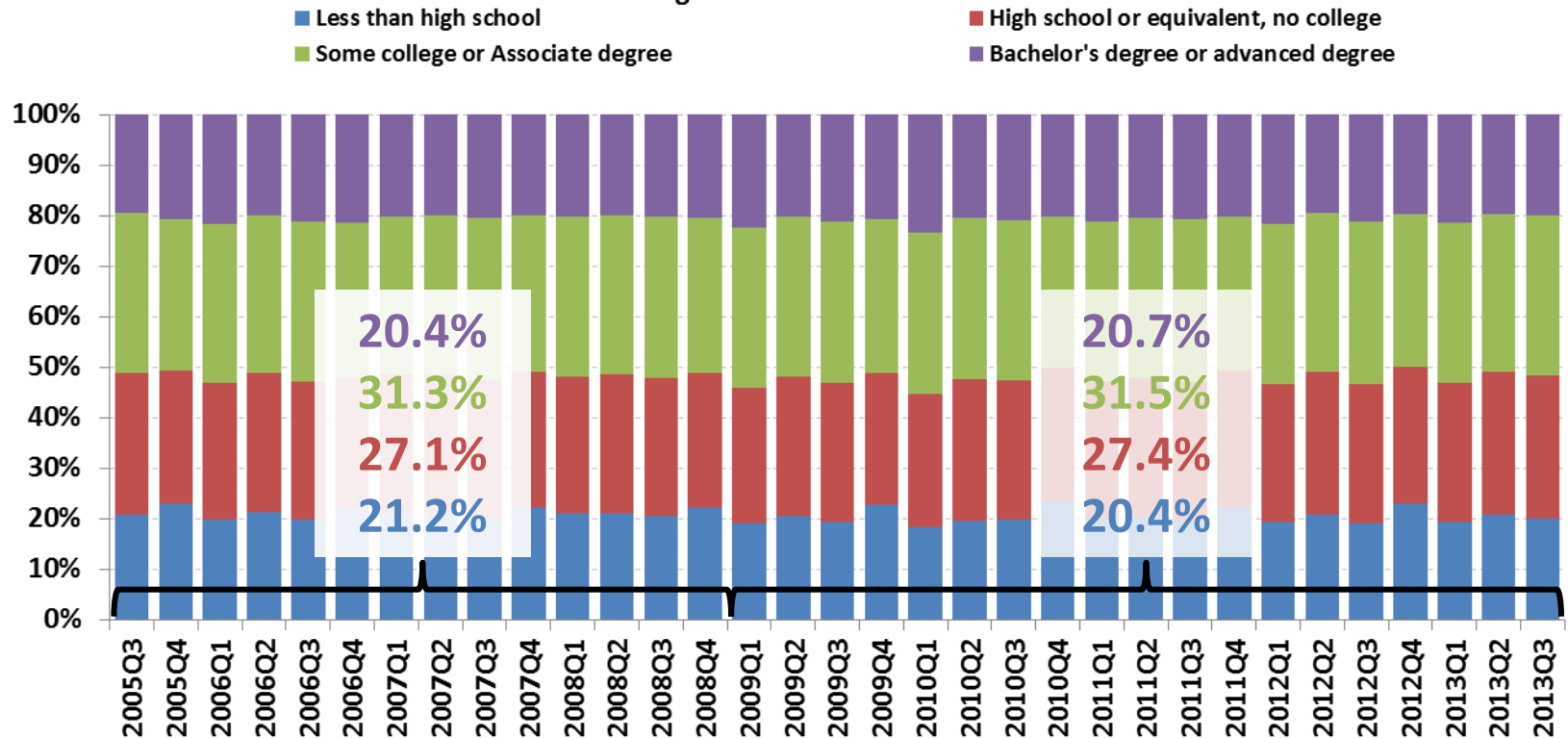
## Over the Year Percent Change, All Education Categories

Hires are Aged 25 and Older



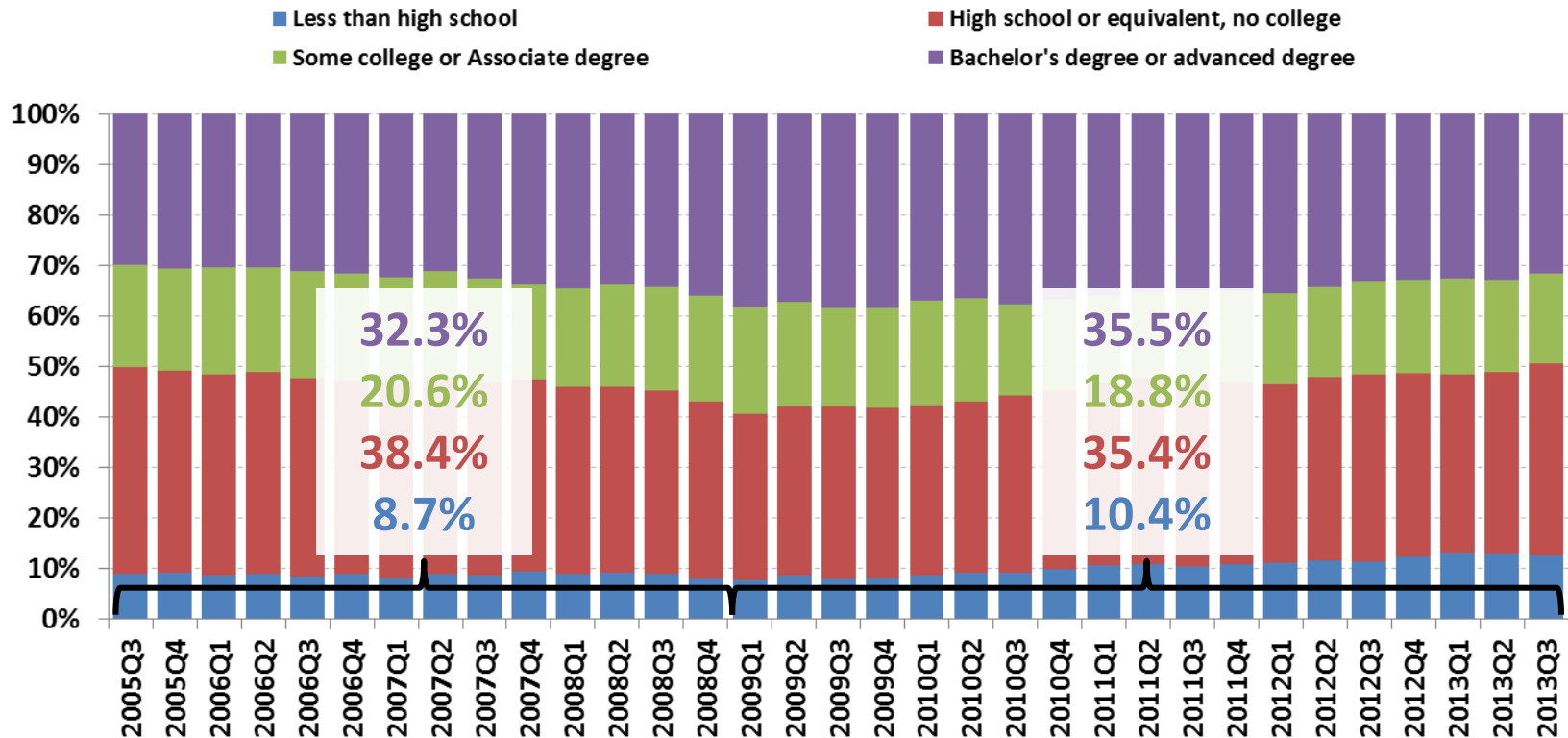
## All Hires by Education Category

Aged 25 and Older



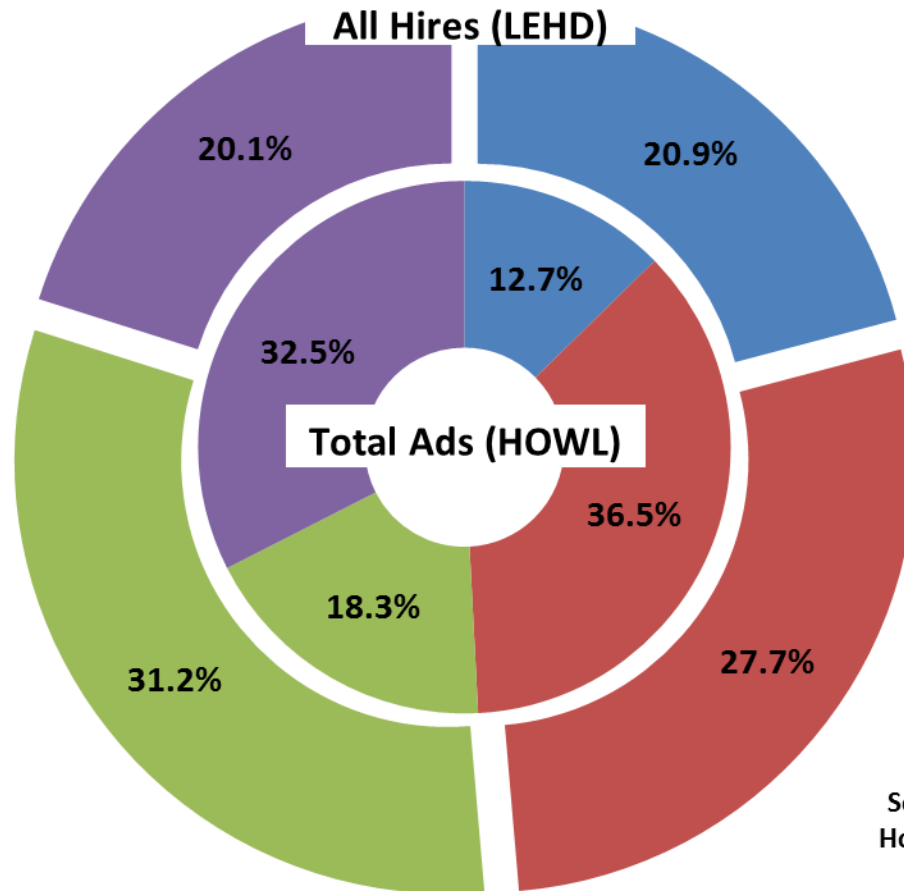
Source: U.S. Census Bureau; Local Employment-Household Dynamics program

## Total Ads by Education Category



Source: Conference Board, Help Wanted Online Data Series





## All Hires (LEHD) vs. Total Ads (HOWL)

Hires are Aged 25 and Older

Average 2012:Q4  
through 2013:Q3

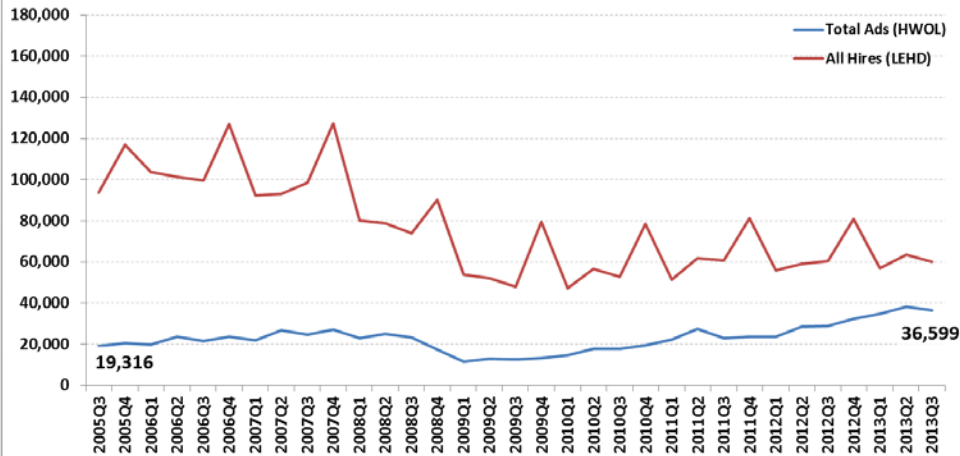
- Less than high school
- High school or equivalent, no college
- Some college or Associate degree
- Bachelor's degree or advanced degree

Sources: U.S. Census Bureau, Local Employment-Household Dynamics program & Conference Board, Help Wanted Online Data Series

# Employment and Population Statistics

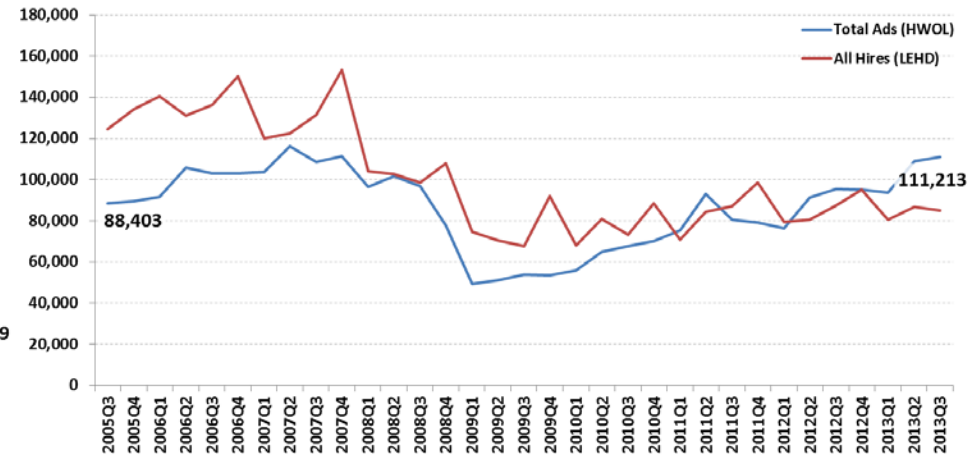
## Less Than High School

Hires are Aged 25 and Older



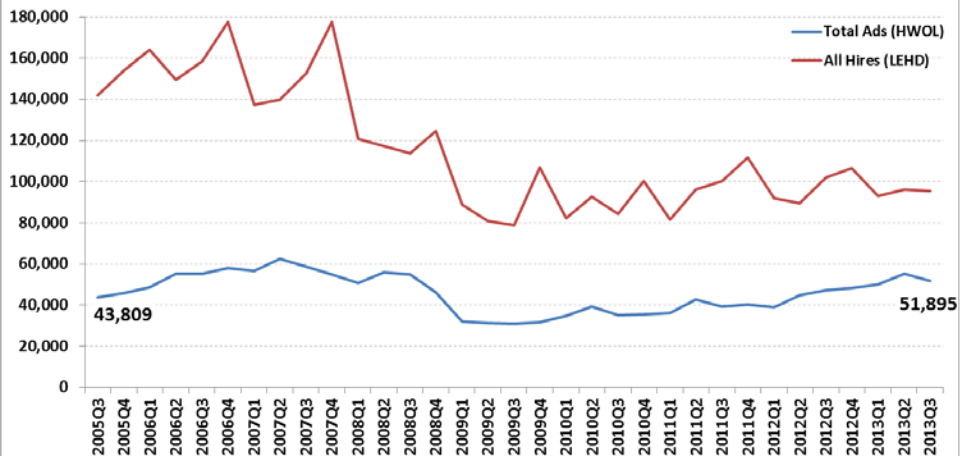
## High School or Equivalent, No College

Hires are Aged 25 and Older



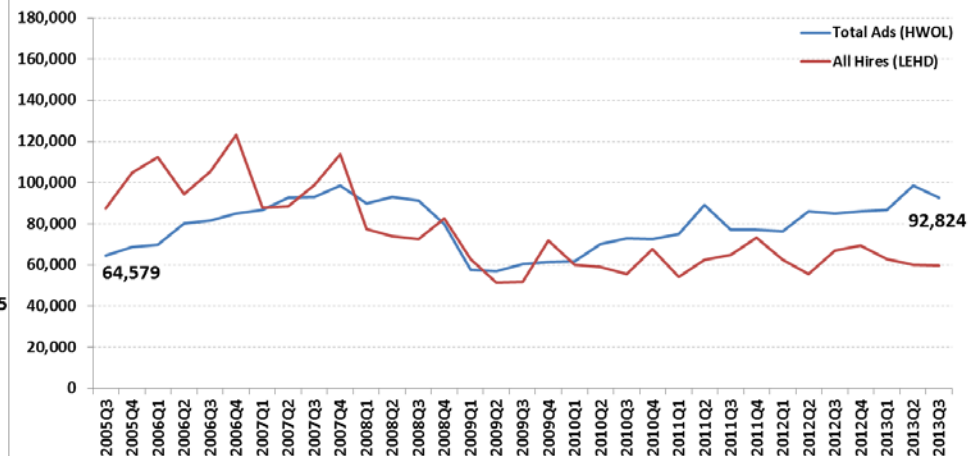
## Some College or Associate Degree

Hires are Aged 25 and Older



## Bachelor's Degree or Advanced Degree

Hires are Aged 25 and Older

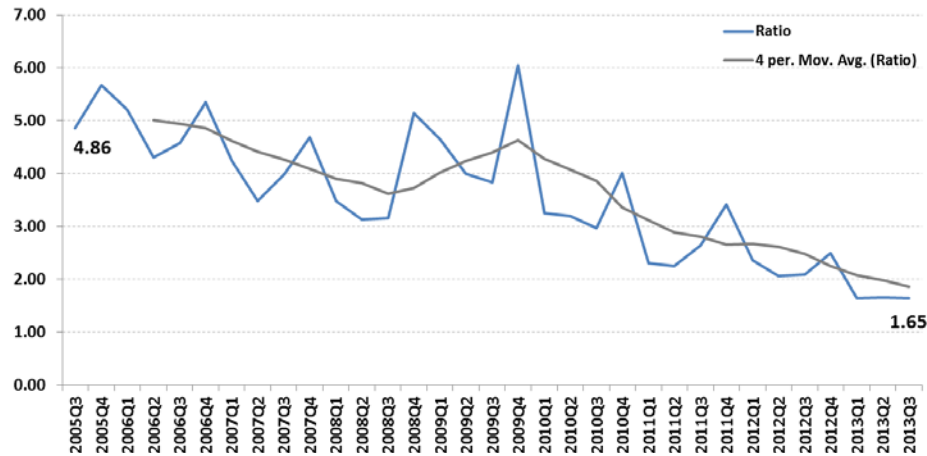


Sources: U.S. Census Bureau, Local Employment-Household Dynamics program & Conference Board, Help Wanted Online Data Series

# Employment and Population Statistics

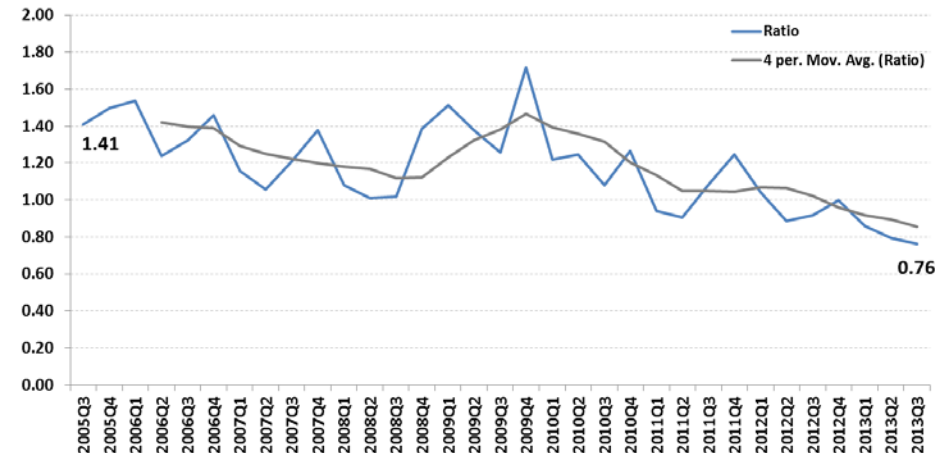
## Hires per Ad, Less Than High School

Hires are Aged 25 and Older



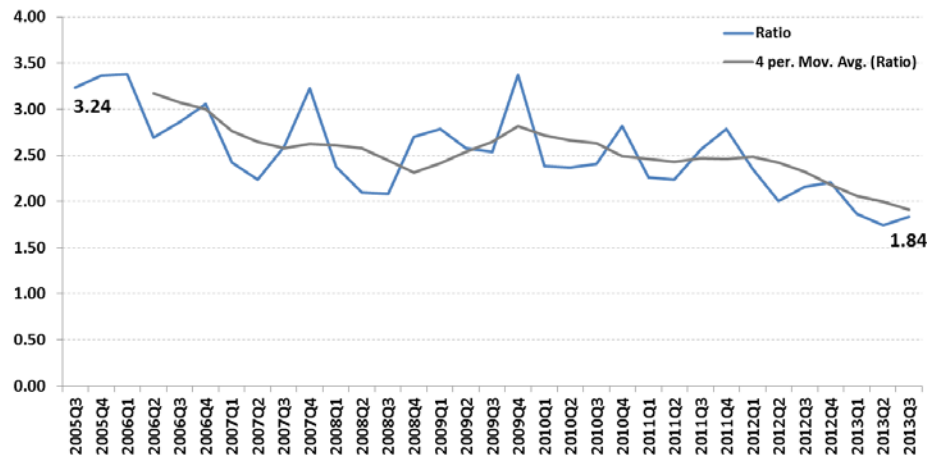
## Hires per Ad, High School or Equivalent, No College

Hires are Aged 25 and Older



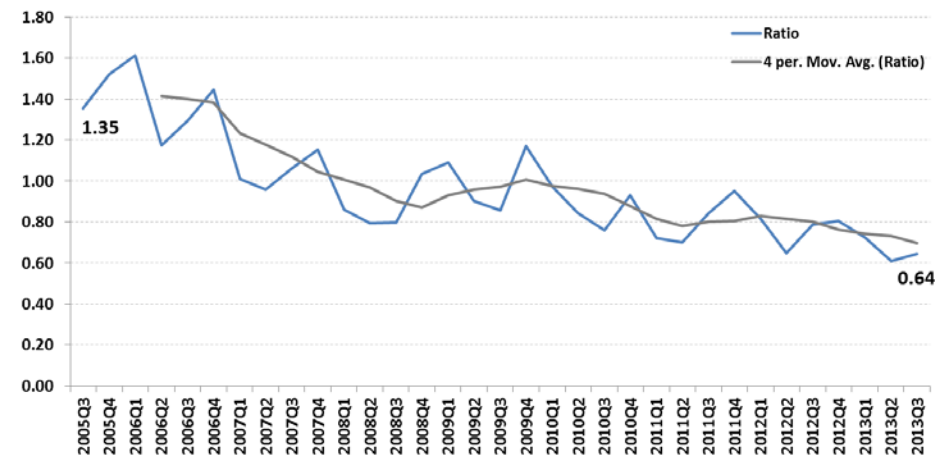
## Hires per Ad, Some College or Associate Degree

Hires are Aged 25 and Older



## Hires per Ad, Bachelor's Degree or Advanced Degree

Hires are Aged 25 and Older



Sources: U.S. Census Bureau, Local Employment-Household Dynamics program & Conference Board, Help Wanted Online Data Series

## All Hires Aged 25 and Older

Cochrane-Orcutt, using observations 2005:4-2013:3 (T = 32)

Dependent variable: All Hires

rho = 0.711248

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
Constant	138762	115680	1.1995	0.23971	
Total Ads	0.893729	0.453439	1.9710	0.05801	*

Statistics based on the rho-differenced data:

Mean dependent var	365829.4	S.D. dependent var	97968.03
Sum squared resid	1.12e+11	S.E. of regression	61184.36
R-squared	0.622881	Adjusted R-squared	0.610310
F(1, 30)	3.884851	P-value(F)	0.058011
rho	-0.149805	Durbin-Watson	2.222030

## All Hires Aged 25 and Older

### Less than high school

#### Yule-Walker Estimates

SSE	1.04011E10	DFE	30
MSE	346702744	Root MSE	18620
SBC	750.34262	AIC	745.853097
MAE	14752.9589	AICC	746.680683
MAPE	20.3835448	HQC	747.363685
Durbin-Watson	2.1866	Regress R-Square	0.0299
		Total R-Square	0.3822

#### Parameter Estimates

Variable	DF	Standard Estimate	Error	Approx t Value	Pr >  t
Intercept	1	57169	21945	2.61	0.0142
E1_ads	1	0.8455	0.8791	0.96	0.3439

### High school or equivalent, no college

#### Yule-Walker Estimates

SSE	6914800410	DFE	30
MSE	230493347	Root MSE	15182
SBC	736.9054	AIC	732.415877
MAE	12548.4381	AICC	733.243464
MAPE	12.8132317	HQC	733.926465
Durbin-Watson	1.8614	Regress R-Square	0.1929
		Total R-Square	0.6697

#### Parameter Estimates

Variable	DF	Standard Estimate	Error	Approx t Value	Pr >  t
Intercept	1	42687	22629	1.89	0.0690
E2_ads	1	0.6603	0.2466	2.68	0.0119

### Some college or Associate degree

#### Yule-Walker Estimates

SSE	9503973659	DFE	30
MSE	316799122	Root MSE	17799
SBC	747.305904	AIC	742.816382
MAE	14606.4968	AICC	743.643968
MAPE	12.5931835	HQC	744.326969
Durbin-Watson	1.7098	Regress R-Square	0.2167
		Total R-Square	0.6664

#### Parameter Estimates

Variable	DF	Standard Estimate	Error	Approx t Value	Pr >  t
Intercept	1	37317	28035	1.33	0.1932
E3_ads	1	1.7040	0.5915	2.88	0.0073

### Bachelor's degree or advanced degree

#### Yule-Walker Estimates

SSE	5250185146	DFE	30
MSE	175006172	Root MSE	13229
SBC	728.077631	AIC	723.588108
MAE	10759.1	AICC	724.415694
MAPE	14.1373654	HQC	725.098696
Durbin-Watson	1.9394	Regress R-Square	0.0274
		Total R-Square	0.5838

#### Parameter Estimates

Variable	DF	Standard Estimate	Error	Approx t Value	Pr >  t
Intercept	1	51402	27161	1.89	0.0681
E4_ads	1	0.3022	0.3286	0.92	0.3651

## Office of Employment and Population Statistics Arizona Department of Administration

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