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Give Me Your Wired and Your Highly Skilled: Measuring the Impact of Immigration Policy on Employers and Shareholders

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Forschungsinstitut
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ABSTRACT

Give Me Your Wired and Your Highly Skilled: Measuring the Impact of Immigration Policy on Employers and Shareholders*

The paper links finance theory to labor economics and political economy in the context of migration and immigration policy. Most research treating the impact of immigration has focused on the consequences for employees as measured by wages, earnings, and employment. Less is known about the impact on employers. We lack answers to basic questions concerning the quantitative impact of immigrants on employer profit, and which employers are most likely to gain (suffer) increased (reduced) profits as a result of immigration. Using event study analysis, I measure the impact of immigration policy on the profit of employers and shareholders, particularly in those industries with high needs for skilled immigrants. The American Competitiveness and Workforce Improvement Act (ACWIA) of 1998 nearly doubled the available number of H-1B visas for skilled foreign workers in FY 1999. It was the first time that the U.S. government raised the annual cap of H-1B visa since 1990. I focus on this bill and analyze whether and by how much its passage increased shareholders' profit. The empirical results show that employers and shareholders in the top H-1B visa user industries enjoyed significant and positive returns with the passage of the ACWIA of 1998. Shareholders in high-tech industries (the top users of H-1B visa, 80% of total) such as "Computers and related equipment", and "Computer and data processing services" gained, respectively, an average 21.54% (15.88 if weighted) and 22.77% (18.11 if weighted) in cumulative excess returns in the month after the Act was passed, while industries with little need for H-1B visas experienced no significant changes in cumulative excess returns. Robustness testing including international factor comparisons, semiparametric modeling and a sample-split Chow structural break test support the results.

JEL Classification: J61, K31, G12

Keywords: skilled immigrants, immigration policy, employers, shareholders, event study, H-1B visa

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I. Introduction

Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore,
Send these, the homeless, tempest-tossed to me,
I lift my lamp beside the golden door![1]

Since this poem was engraved on the Statue of Liberty in 1903, it has symbolized America's openness to all people, regardless of region of origin or skill level. However, immigrants are typically the first to blame in the face of economic strain, stagnant or collapsing income and joblessness.

Work by economists increasingly challenges this presumption. Most research treating the impact of immigration has focused on the consequences for employees as measured by wages, earnings, and employment. Less is known about the impact on employers. We lack answers to basic questions concerning the quantitative impact of immigrants on employer profit, and specifically on which employers are most likely to gain (suffer) increased (reduced) profits as a result of immigration.

This paper links finance theory to labor economics and political economy in the context of migration and immigration policy. By using event study analysis and the market model, I measure the impact of immigration policy on the profit of employers and shareholders. In particular, I focus on those industries with high needs for skilled immigrants. The American Competitiveness and Workforce Improvement Act (ACWIA) of 1998 nearly doubled the available number of H-1B visas for skilled foreign workers in FY[2] 1999. I focus on this bill and analyze whether and by how much its passage increases employers' profit.

The first studies linking finance and labor literature can be traced back to 1980s. Ruback and Zimmerman (1984) show that successful union elections result in a 3.8% decline in shareholder equity of organized firms. Becker and Olson (1986) use event study to analyze the impact of strikes on shareholder equity, showing that strikes substantially affect shareholder. From 1962-82 the average strike involving 1,000 or more workers result

[1] "The New Colossus", written by Emma Lazarus in 1883, was engraved on a bronze plaque and mounted inside the Statue of Liberty in 1903.

[2] FY is the abbreviation of "fiscal year". The U.S. government's fiscal year begins on October 1 of the previous calendar year and ends on September 30 of the year with which it is numbered.

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in a 4.1% drop in shareholder equity, a decline of $72-87 million in 1980 dollars. Becker and Olson (1989) examine union-nonunion differences in the allocation of both firm profits and business risk to employees and shareholders finding over the period 1970-81 shareholders in unionized firms assumed less of the firm's business risk than shareholders in nonunion firms. Risk-adjusted returns to shareholders are lower in unionized firms than in nonunion firms. Card and Krueger (1995) analyze how the change of the minimum wage affects low-wage employers' profits. They focus on a large sample of publicly traded firms, finding that regulation increasing the minimum wage may have had a small negative effect on the value of such firms-on the order of 1 - 2%. However, after adjusting for overall market returns, their results provide mixed evidence that the value of these firm changes in response to legislative maneuvering on the minimum wage.

I begin by describing my estimation strategy in section II. In section III, I describe the H-1B visa program. Section IV contains data and descriptive statistics and section V provides empirical results, in which I check the robustness by comparing the results of industries with little need for skilled immigrants, international factor (Canada, UK and Germany), semiparametric modeling and structural break tests. Section VI provides concluding remarks.

II. Empirical Methodology

A. Measuring the Welfare of Employers and Shareholders

To measure the impact of immigration policy on the welfare of employers and shareholders, the first question to address is which measure should be used to estimate their welfare. A central assumption in the finance literature is that if capital markets are efficient, and therefore the prices of capital assets are unbiased estimates of the present value of future profit streams generated by those assets (Fama, Fisher, Jensen and Roll (1969), Schwert (1981)).

Since a firm can be viewed as a bundle of capital assets, firm value or the present value of the shareholders' claim to this profit stream is a function of the expected future cash flow and the variance in the cash flow. The firm's economic profit at time t to employers and shareholders is simply the price of an individual share of common stock multiplied by the number of shares outstanding. Changes in stock prices (returns) can be

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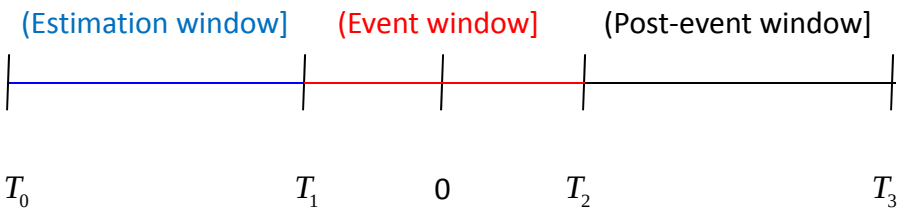
interpreted as an estimate of the change in the value of the firm caused by new information regarding the future profitability of the firm (Becker and Olson (1986)). Hence, shareholder returns over a given period are measured as the change in common stock prices during that period plus dividends paid.[3]

I use event study analysis and the market model to estimate employers' normal and abnormal returns[4] under the impact of immigration legislation. Figure 1 illustrates the time line of the event study. By defining $t = 0$ as the event day, $t = T_1 + 1$ to T_2 represents the event window, and $t = T_0 + 1$ to $t = T_1$ is the estimation window which is used to estimate the normal performance return of a firm.

The length of estimation window must be chosen first. Typically, 255 days is selected to correspond approximately to the number of trading days in a calendar year. For the event window, 20 days (10 days before/after the event day), 30 days (15 days before/after the event day) and 60 days (30 days before/after the event day) are usually used to see the pattern of abnormal returns before/after the event day. In order to fully understand the impact before and after the immigration legislation, I choose 60 days event window.

Figure 1 Time Line for an Event Study



Note: Estimation window (T_0 – T_1) = 255 days corresponds approximately to the number of trading days in a calendar year. Event widow (T_1 – T_2) = 60 days plus an event day t=0.

The abnormal return over the event window can be interpreted as a measure of the impact of the event on the value of the firm. Thus, the methodology employed implicitly

[3] This paper only focuses on economic profits rather than accounting profits. Economic profits are the stream of net cash flows that accrue to shareholders. As owners of the firm's assets, they represent revenues minus operating costs and new investments. Shareholders' wealth is simply the present value of these net cash flows. Strictly speaking, firm value should also include the value of debt as well. This paper focuses, however, on the interests of shareholders since the claims of bondholders are largely fixed.

[4] In some research abnormal returns are called excess returns.

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assumes the event is exogenous with respect to the change in market value of the security. In other words, the revision in value of the firm is caused by the event which can be viewed as the change in the welfare of employers and shareholders.

B. Stock Market Evaluation – The Market Model

In examining the impact of skilled immigrants on shareholders, the effect of overall market factors can be removed by estimating a standard market model. Formally, a daily return market model can be expressed as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{1}$$

$$E[\varepsilon_{it}] = 0 \quad Var[\varepsilon_{it}] = \sigma^2_{\varepsilon_i},$$

where R_{it} is the return on the common stock of firm i on day t, adjusted for stock splits and dividends; R_{mt} is the return on the value-weighted NYSE/AMEX/NASDAQ index on day t; α_i and β_i are regression coefficients; and ε_{it} is the error term of firm i on day t.

Under general conditions and assumptions under which asset returns are jointly multivariate normally distributed with mean μ and covariance matrix Ω for all t, ordinary least squares (OLS) is a consistent and efficient estimation procedure for the market model parameters.

The estimated abnormal return (AR), also known as prediction error, can be calculated for each firm i for each day t in the analysis period by

$$\begin{aligned} AR_{it} &\equiv \hat{\varepsilon}_{it} \\ &= R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \end{aligned} \tag{2}$$

where AR_{it} is the abnormal return of firm i on day t and $\hat{\alpha}_i$, $\hat{\beta}_i$ are estimates of α_i and β_i.

The abnormal returns (AR) are estimates of the abnormal returns to the stockholders of the sample of firms on each trading day. Mean abnormal returns ($\overline{AR}$) across all firms

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can be calculated for each day in the analysis period and the mean abnormal return of an industry is obtained. These averages are then accumulated to provide a series of cumulative mean abnormal returns (CAR) around each event. That is,

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} \overline{AR}_t \qquad (3)$$

In order to draw inferences for the event of interest, the abnormal return observations must be aggregated. The aggregation is along two dimensions – through time and across firms.

To proceed, one first obtains the normal performance return (the 255 days estimation window) of firm i with equation (1). Second, calculate abnormal return of firm i on trading day t using equation (2). Third, calculate the mean of the abnormal returns of all firms in that particular industry on each trading day. Last, accumulate the mean abnormal returns across time using equation (3). From these steps, one can calculate the cumulative effect of immigration policy on the welfare of employers and shareholders.

C. Testing Abnormal Returns

After obtaining the mean abnormal returns ($\overline{AR}$) and cumulative mean abnormal returns (CAR) of industries, one can test whether the abnormal returns are statistically different from zero. A common assumption used to formulate tests of statistical significance is that abnormal returns are normally distributed. Under the null hypothesis H_0 the event window sample abnormal returns (prediction errors) is

$$\hat{\varepsilon}_i^* \sim \mathrm{N}(0,\ \mathrm{V}_i) \qquad (4)$$

Equation (4) gives the distribution for any single abnormal return observation. V_i is the variance-covariance matrix of the estimated abnormal return $\hat{\varepsilon}_i^*$.

In the literature, many tests have been developed to check the abnormal return performance in an event study. The classic test statistic, proposed by Patell (1976), is referred to as the Patell t-test, used to test whether abnormal returns are significant from zero, assuming security returns are normally distributed.

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Since abnormal returns are likely to be serially correlated, Mikkelson and Partch (1988) use a corrected version of the Patell t-test. The corrected test accounts for the fact that, within the window, abnormal returns for each stock are serial correlated. The serial correlation occurs because all the abnormal returns are functions of the same market model intercept and slope estimators. Brown and Warner (1980, 1985) suggest that, in general, event-study tests are well specified and reasonably powerful. However, they identify potential testing problems created by an event-induced increase in variance. They note that if the variance is underestimated, the test statistic will lead to rejection of the null hypothesis more frequently than it should, even when the mean abnormal performance is zero. To account for this issue, Boehmer, Musumeci and Poulsen (1991) introduce an empirical cross-sectional variance adjustment in place of the analytical variance of the total standardized prediction error. The test is often referred to as standardized cross-sectional test.

In addition to serial correlation, abnormal returns may also be cross-sectionally correlated. To account for this issue, Brown and Warner (1980) introduce a "crude dependence adjustment" test, also known as the time-series standard deviation test. Unlike the Patell t-test, the time series standard deviation test uses a single variance estimate for the entire portfolio. Therefore, the time series standard deviation test does not take account of unequal return variances across securities. Hence, the test avoids the potential problem of cross-sectional correlation of security returns.

A subsequent branch of studies involved testing the performance of robust tests that did not rely on an assumption of normally distributed returns for correct specification. The most successful among these tests is the nonparametric sign test. Nonparametric tests are motivated by concerns that non-normally distributed security returns may cause tests to be poorly specified and yield imprecise inferences. Therefore, besides the parametric tests described above, nonparametric tests can be used to supplement the validity of the results. This paper uses the general sign test. The nonparametric sign test is that for each trading day in the event period and for each window, the number of securities with positive and negative mean abnormal returns can be reported. Under the null hypothesis, the fraction of positive returns in the event window is the same as in the estimation period. For example, if 40% of market returns are positive in the estimation period, while 70% of firms

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have positive market returns on event day 1, the general sign test checks whether the difference between 70% and 40% is significant.

I use both parametric and nonparametric tests as described above. Test results are reported in section V.

III. Background on the H-1B Visa Program

Nonimmigrant[5] temporary workers seeking employment in the United States are generally classified in the "H" visa category. The largest numbers of H visas are issued to temporary workers in specialty occupations, known as H-1B nonimmigrants. The regulations define a "specialty occupation" as requiring theoretical and practical application of a body of highly specialized knowledge in a field of human endeavor including, but not limited to, architecture, engineering, mathematics, physical sciences, social sciences, medicine and health, education, law, accounting, business specialties, theology, and the arts, and requiring the attainment of a bachelor's degree or its equivalent as a minimum.

The prospective H-1B nonimmigrants must demonstrate that they have the requisite education and work experience for the posted positions to the U.S. Citizenship and Immigration Services Bureau (USCIS)[6] in the Department of Homeland Security (DHS). USCIS then approves the petition for the H-1B nonimmigrant (assuming other immigration requirements are satisfied) for periods up to three years. An individual can stay a maximum of six years on an H-1B visa.

The H-1B program was established in 1990[7] to permit skilled foreigners to work in the United States. The program grew out of the H-1 visa program, which was created during the early 1950s to allow firms to hire temporary skilled foreign workers in the United States on a temporary basis. Beginning in 1970, employers were allowed to hire foreigners for permanent positions, and the number of visas issued increased as the U.S. economy boomed during the 1980s.

Under "The Immigration Act of 1990", visas for employment-based immigrants rose to

[5] A nonimmigrant is an alien legally in the United States for a specific purpose and a temporary period of time.

[6] Formerly the Immigration and Naturalization Service (INS).

[7] President George H.W. Bush's signing of the "The Immigration Act of 1990" is often considered the day H-1B was born.

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140,000 from the 58,000 cap established in 1976. The 1990 Act set an annual cap of 65,000 nonimmigrants entering the U.S. under H-1B visas. The Act required employers to pay H-1B workers the prevailing wage. In addition, the 1990 Act created three other new visa categories for skilled temporary workers–the H-1A visa for nurses, and O and P visas for prominent scientists, educators, artists, athletes and entertainers.[8]

Figure 2 illustrates the annual H-1B visa issuance cap since 1990. The American Competitiveness and Workforce Improvement Act of 1998 (ACWIA of 1998) added new attestation requirements for recruitment and layoff protections, but only applied them to "H-1B dependent" firms (generally defined as at least 15% of workforce are H-1Bs workers). All firms have to offer H-1Bs benefits as well as wages comparable to their U.S. workers. Education and training for U.S. workers is funded by a $500 fee paid by the employer for each H-1B worker that is hired. The ceiling was 115,000 in both FY 1999 and FY 2000, 107,500 in FY 2001, and back to 65,000 in FY 2002. In October, 2000, the Twenty-First Century Act of 2000 (AC21) raised the number of H-1B visas by 297,500 over three years. That is, AC21 raised the cap in FY 2001 from 107,500 to 195,000 and in FY 2002 from 65,000 to 195,000. The cap in FY 2003 was 195,000. Starting in FY 2004, the H-1B visa cap reverted back to 65,000 and presently remains at that level. In addition, AC21 excluded all H-1B nonimmigrants who work for universities and nonprofit research facilities from the new ceiling. A provision that would have exempted H-1B nonimmigrants with at least a master's degree from the numerical limits was dropped from the final bill. The H-1B Visa Reform Act of 2004 mandates that the first 20,000 H-1B petitions filed on behalf of aliens with U.S.-earned masters' or higher degrees will be exempt from any fiscal year cap on available H-1B visas.

It is clear from Figure 2 that since 1990 the ACWIA of 1998 was the first time the annual H-1B visa cap was raised, nearly doubled the number of H-1B visas. As such, the ACWIA of 1998 is a good candidate to study the impact of the increased skilled immigrants on the welfare of employers and shareholders.

[8] Zavodny (2003).

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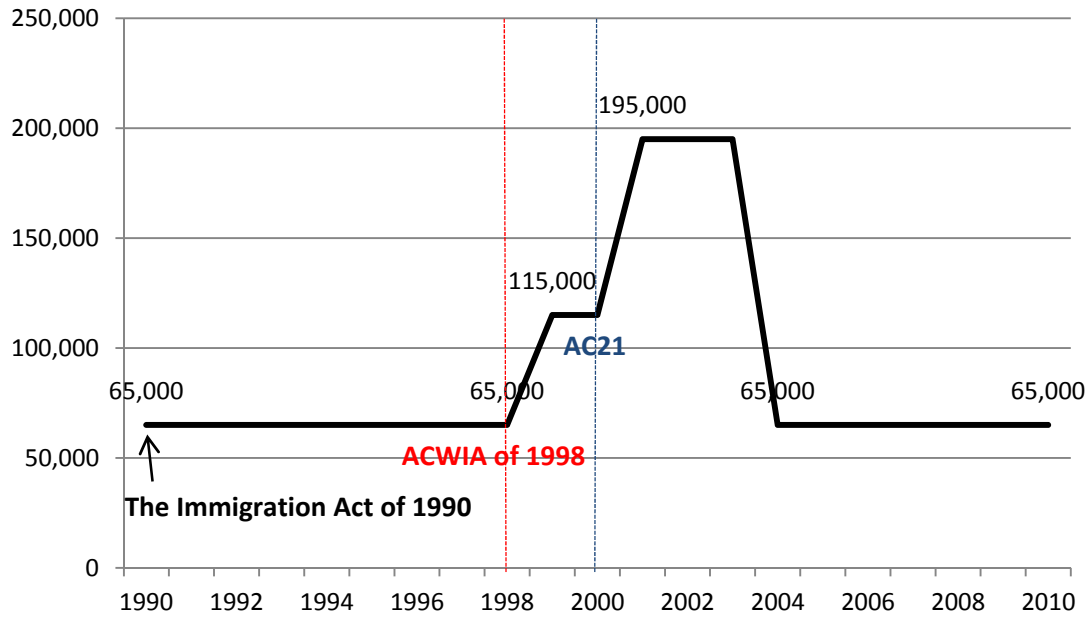
Figure 2 Annual H-1B Visa Issuance Cap



Source: USCIS (U.S. Citizenship and Immigration Services).

A. The American Competitiveness and Workforce Improvement Act of 1998

During the 1990s, the booming economy, low unemployment, and a shortage of skilled domestic workers dramatically increased U.S. employers' demand for skilled foreign workers. This trend was especially pronounced in the information technology (IT) and computer industries. For many years, the U.S. high-tech industry has been the dominant participant in the H-1B visa programs. Prior to 1998, the U.S. Congress capped the annual quota of new H-1B at 65,000. Because of this limitation, the existing H-1B visa program could no longer meet high-tech industry's voracious demand for foreign skilled workers. Since 1997, H-1B visas have been oversubscribed: the number of H-1B admissions reached the statutory cap of 65,000 before the end of each fiscal year, and employers petitioning late in the year were required to wait until the next fiscal year for the admission of approved workers.

The high-tech industry actively lobbied Congress to raise the annual cap on the number of H-1B visas granted to immigrants. However, the effort met vigorous opposition from a vocal minority in Congress, labor unions, and the White House. After months of wrangling, the White House and congressional supporters of the new H-1B bill finally

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reached a compromise in the fall of 1998. On October 21 of that year, President Clinton signed into law, the American Competitiveness and Workforce Improvement Act of 1998. The Act nearly doubled the available number of H-1B visas over the next three years.

B. Legislation History of ACWIA of 1998[9]

In early 1998, Republican Senator Spencer Abraham of Michigan sponsored legislation addressing the issue of the annual H-1B visa cap and the needs of the high-technology labor market; the Senate debated the matter in early 1998. The Senate, with little opposition, passed the American Competitiveness Act raising the annual cap on H-1B visas on May 18, 1998. However, the attempt to raise the H-1B visa cap met strong opposition in the House of Representatives from traditionally pro-labor Democrats and anti-immigration Republicans.[10] These legislators received the backing of labor unions[11] and professional engineering organizations such as the Institute of Electrical and Electronics Engineers-USA (IEEE-USA).[12] The opposition to the proposal transcended traditional party lines, forming an odd coalition of liberal, pro-labor Democrats and conservative, anti-immigration Republicans.

Under pressure from labor unions and pro-labor Democrats, the White House initially

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[9] Hahm (2000) describes the detailed legislation history. This section is drawn from the paper.

[10] Patrick Buchanan, Commentary, *Sellout of High-Tech Jobs*, Washington Times, August 19, 1998, at A17 (criticizing the H-1B visa program for transforming the American workplace into the "Asian environment," and the Silicon Valley companies for failing to "Americanize" their labor force); Spencer Abraham and David McIntosh, Commentary, *Why America Needs Temporary Foreign Workers*, Washington Times, September 1, 1998, at A16 ("On this issue [of H-1B visas], Pat Buchanan... [is] wrong, and America's innovators are right."); William Branigin*, House Sets Aside Bill to Allow Hiring of More Foreign Workers: Measure Sought by High-Tech Firms Had Split GOP*, Washington Post, August 1, 1998, at A2 (discussing the split among Republicans on the issue of raising the H-1B visa cap).

[11] William J. Holstein, *Give Us Your Wired, Your Highly Skilled: Tech Firms Are Winning the Battle of the Visas*, U.S. News & World Report, October 5, 1998, at 53 (reporting the demands of labor organizations like the Communications Workers of America and the AFL-CIO that "Americans displaced by global competition or downsizings ought to have first priority in taking the high-paying jobs").

[12] John R. Reinert, Commentary, *Trojan Horse in the Free Labor Market?*, Washington Times, Sept. 26, 1998, at C2 (asserting that the H-1B visa program hurts U.S. engineers); Zitner, *supra* note 16, at C1 (quoting IEEE-USA president John Reinert as stating that "[the evidence doesn't suggest that there is a labor shortage, and there is no need to increase the number of visas"). According to IEEE-USA, a report by an outplacement firm showed that high-tech industries have laid off 143,000 workers in 1998, more than any other sector of the economy; Robert MacMillan, *H-1B Visa Bill Ready for Passage*, Newsbytes, October 8, 1998, available at LEXIS, News Library, Wire Service Stories File (reporting IEEE-USA president-elect Paul Kostek's argument that "it's bizarre policy to give the industries laying off the most US workers special access to an expanded foreign guest-worker program").

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opposed the new H-1B visa bill due to concerns over the perceived inadequacy of the job-protection provisions in the original bill. As the House of Representatives prepared to consider the bill before the August recess, the White House issued a public veto threat and listed changes that have to be sought into the bill." After months of wrangling and intense negotiations, the White House and the congressional supporters of the bill reached a compromise on September 23, 1998, in which they agreed to raise the H-1B visa cap while including additional protective measures for American workers. The House passed the new H-1B visa bill the next day. However, the bill faced an unexpected sudden death in the Senate on October 9, when a small number of senators led by Democrat Tom Harkin of Iowa blocked the vote.[13] After a skillful legislative maneuver by its supporters, the H-1B visa bill made a remarkable, eleventh-hour comeback as part of the omnibus appropriations bill on October 15.[14] On October 21, 1998, President Clinton signed the controversial compromise H-1B visa bill into law: the American Competitiveness and Workforce Improvement Act of 1998.

IV. Data and Descriptive Statistics

To measure the impact of the ACWIA of 1998 on employers, determining which firm/industry received how many H-1B visas is crucial. However, the USCIS does not provide a detailed accounting of the number of H-1B visas issued during FY 1999. The ACWIA of 1998 requires that information about successful H-1B visa applications be submitted each year to Congress. The first report (*Report on Characteristics of Specialty Occupation Workers (H-1B)*) was submitted to Congress for those workers approved for H-1B status in FY 2000. The FY 2000 report only shows the distribution of beneficiaries by major occupation group. It wasn't until FY 2001 that the report included the specific industries employing the most H-1B workers. The other source of data is the study by

[13] *Bill to Bring Technology Workers to U.S. Dies*, New York Times, Oct. 10, 1998, at C2 (reporting the 11th-hour death of the H-1B visa bill); Ashley Dunn, *Plan to Increase High-Tech Work Visas Dies in Senate*, L.A. Times, October 10, 1998, at C1.

[14] Mark Leibovich, *High Tech Is King of the Hill: Rash of Legislative Wins Has Industry Celebrating*, Washington Post, October 16, 1998, at F1 ("Technology lobbyists, executives and congressional supporters managed to attach the bill to the broader budget package."). Tom Abate and Jon Swartz, *11th-Hour Victory For Tech / Visa increase, R&D tax measure in budget bill*, San Francisco Chronicle, October 16, 1998 ("The high-tech industry was in high spirits yesterday after scoring a series of 11th-hour legislative victories -- just days after it looked like its political agenda might get shut out.")

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Lowell and Christian (2000). They report that in 1999 fully 80% of the top H-1B users are in the IT industries, the balance being non-IT. Among the non-IT companies there is no large, single sector but there are clear lines of business: 7% of the top H-1B firms are in business/management consulting, another 4% are in executive/temporary placement services, and nearly 6% are in accounting/ engineering services.

Because the data in detailed industry is not available in FY 1999, I use 1% 2001 to 2008 American Community Survey (ACS) and 5% 1980, 1900, 2000 Integrated Public Use Microdata Series USA (IPUMS-USA) to get the top H-1B visa user industries and cross validate by using the Report on Characteristics of Specialty Occupation Workers (H-1B) of USCIS from FY 2000 to FY 2009 and the study of Lowell and Christian (2000). Table 1 indicates the distribution of beneficiaries by major occupation group. Nearly 55% of all H-1B petitions approved in FY 2000 were accounted for by computer-related occupations. The second and third most numerous occupation groups, in order, are architecture, engineering, and surveying and administrative specializations. The former group includes computer and systems engineers while the latter contains accountants and management systems analysts.

Table 1 H-1B Petitions Approved by Major Occupation Group of Beneficiary: FY2000

Occupation	Total*	Percent
Total	135,362	100.0
Computer-related	74,551	55.1
Architecture, engineering, and surveying	17,086	12.6
Administrative specializations	11,468	8.5
Education	7,210	5.3
Medicine and health	4,734	3.5
Managers and officials	4,366	3.2
Others (11 occupations)	15,947	15.8

Note: The total is the initial employment, not continuing employment.
Source: *Report on Characteristics of Specialty Occupation Workers (H-1B): FY 2000*, USCIS.

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Table 2 shows the H-1B petitions approved by detailed industry (4-digits NAICS[15] code) from FY 2001 to FY 2008. The IT industries are the top H-1B user in the past ten years. The remaining balance goes to Colleges and universities, Architectural, Engineering, Management and Research industries.

Using ACS and IPUMS-USA data, I summarize the top 10 industries (3-digits NAICS code) which hire skilled foreign workers by number and by percentage in the Appendix Table A11 and Table A12. In 2000, the top 10 industries are Computers and related equipment, Computer and data processing services, Research, development, and testing services, Colleges and universities, Electrical machinery, equipment, and supplies, Management and public relations services, Engineering, architectural, and surveying services, Radio, TV, and computer stores, Security, commodity brokerage, and investment companies and Hospitals. Since there were only five and two firms publicly traded in College and universities, and Radio, TV and computer stores industry, respectively, during the estimation period. I drop the two industries in my analysis.

Although the H-1B visa user data was incomplete in FY 1999, by cross validation I show that the top H-1B visa user industries which will be used to analyze the impact of immigration policy, the ACWIA of 1998, are 1) Computers and related equipment, 2) Computer and data processing services, 3) Research, development, and testing services, 4) Electrical machinery, equipment, and supplies, 5) Management and public relations services, 6) Engineering, architectural, and surveying services, and 7) Security, commodity brokerage, and investment companies.

It is also of interest to understand the trends and statistics of skilled immigrants in the United States. Using ACS and IPUSM-USA data, I define a person as an immigrant if he or she was born in a foreign country. The term “foreign born” refers to people residing in the United States at the time of the census who were not US citizens at birth. The foreign-born population includes naturalized citizens, lawful permanent immigrants, refugees and asylums, legal nonimmigrants (including those on student, work, or other temporary visas), and persons residing in the country without authorization. I restrict the analysis to individuals who age 25 to 64, not self-employed or working without pay and not residing in group quarters. Skilled immigrants are defined as those who have 13 or greater years of schooling. Person weight is used throughout the paper.

Source of Region

Table A3 and Table A4 in the Appendix summarize the source of region of skilled

[15] NAICS stands for North American Industrial Classification System.

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immigrants. From 1980 to 2000, the largest number and proportion of skilled immigrants come from Europe. In 1980, 31.84% of immigrants were from Europe; then it decreased to 24.39% in 1990 and to 22.02% in 2000. Despite the decreasing trend, Europe is still the largest source region of skilled immigrants in the last three decades. Other important sources of regions of skilled immigrants are East Asia (average 12.15%), Southeast Asia (average 13.71%) and India/Southwest Asia (average 8.71%). Note that the trend of the three regions is increasing over time.

Occupation

Table A5 and Table A6 show seven general occupations of skilled immigrants in the United States. In Table A5, most skilled immigrants work as managerial and professional specialty (average 44.25%) from 1980 to 2000. The second most popular occupation is technical, sales and administrative support (average 31.05%).

Besides the seven general occupations, we may be interested in the detailed occupations. There are approximately 900 occupations which can be identified from the survey data. Table A9 and Table A10 summarize the detailed occupations for skilled immigrants. In Table A9, managers and administrators have the largest number of skilled immigrants in 1980, 1990 and 2000. Registered nurses, salespersons occupation also have many skilled immigrants in 1980 and 1990. Note that in 2000, computer software developers and computer system analysts have the most skilled immigrants. By percentage, physicians, physical scientists and engineers are the highest percentage occupations among skilled immigrants. Note that physicians averages 24.17% from 1980 to 2000. Physical scientists is even as high as 40% in 2000.

Industry

For the purpose of understanding the impact of skilled immigrants on the welfare of employers, knowing which industries hire the largest number and highest percentage of skilled immigrant is particularly important. Table A7 summarizes the thirteen general industries in which immigrants are likely to work. The industry that has the largest number of skilled immigrants is professional and related services (average 32.8% from 1980 to 2000). The second and the third largest are manufacturing and retalesale trade.

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Manufacturing averages 18.15% and the trend is decreasing over time. On the other hand, retalesale trade averages 10.88% and the trend is increasing.

Table A11 reports the top 10 (by number and by percentage) detailed industries which hire skilled immigrants. The table shows an important fact that hospitals, colleges and universities, elementary and secondary schools have the largest number of skilled immigrants from 1980 to 2000. In terms of percentages, in 1980, engineering, architectural, and surveying services, colleges and universities have the highest percentage of skilled immigrants. Starting 1990, computer related industries (computers and related equipment, computer and data processing services) and research, development, and testing services gradually become the industries hiring the highest percentage of skilled immigrants. The importance of skilled immigrants in the computer related industries has been growing over time. Take computers and related equipment industry for example. In 1980, the percentage of skilled immigrants in the industry was 6.95%, and then it increased to 11.67% in 1990 and 19.19% in 2000. The other computer related industry, computer and data processing services, also has 18.57% skilled immigrants among all employees.

V. Empirical Results

This paper estimates the impact of the legislation of ACWIA of 1998 on the returns of employers and shareholders. Stock returns are obtained from the Center for Research on Security Prices (CRSP). The industries used are Computers and related equipment, Computer and data processing services, Research, development, and testing services, Electrical machinery, equipment, and supplies, Management and public relations services, Engineering, architectural, and surveying services, Security, commodity brokerage, and investment companies. The list includes IT and non-IT industries and is consistent to the data in section IV. The event day (day 0) of October 15, 1998 is chosen because the bill made an eleventh-hour comeback after a sudden death on October 9.

Thirty trading days window before and after the event day are used to see if the passage of AWCIA of 1998 has a positive or negative impact on top H-1B user firms. The procedure of calculating mean abnormal returns and testing for abnormal returns are described in section II. Empirical results are summarized in Table 3. Daily individual industry results are reported in the Appendix Table A13 to Table A19.

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In Table 3, Computers and related equipment industry (Apple, Sprint, Seagate, etc.) has a -0.09% mean abnormal return between day -30 to day 0, and a 0.72% mean abnormal return between day 1 and day 30. When accumulating mean abnormal returns from day 1 to day 30, Computers and related equipment industry has a 21.54% cumulative abnormal return in the month with the passage of the bill. The four statistical tests of null hypothesis zero mean returns all reject the null and are significant at 0.1% level. Cumulative mean abnormal returns from day -30 to day 0 is -2.83% and not significant in the four tests. Computer and data processing services industry (Oracle, Microsoft, Compaq, Yahoo, etc.) has a -0.27% mean abnormal return between day -30 to day 0, and a 0.76% mean abnormal return between day 1 and day 30. When accumulating mean abnormal returns from day 1 to day 30, Computer and data processing services industry has a 22.77% cumulative abnormal return in the month after the bill was passed in the Senate. The four statistical tests all reject the null and are significant at 0.1% level. In short, the IT industry (80% of total H-1B visas in FY 1999) benefited from the passage of the ACWIA of 1998. The remaining 20% H-1B visa recipients (non-IT industries) such as Electrical machinery, equipment, and supplies, Management and public relations services, Engineering, architectural, and surveying services, Security, commodity brokerage, and investment companies all gained from this Act shown in Table 3.

Examining the returns graphically and comparing the patterns across industries is extremely helpful in interpreting the results. Figure 3 shows the graphs of mean abnormal return (dash line) and cumulative mean abnormal return (solid line) for the seven top H-1B visa user industries. The graphs show that the returns were affected by the legislation of ACWIA of 1998. All seven industries in Figure 3 show a similar trend of rising cumulative mean abnormal returns after the event day (October 15, 1998), the day which the H-1B visa bill made an eleventh-hour comeback. On October 21, 1998 (day 4), the day that President Clinton signed the H-1B visa bill did not show a particular effect, which is not surprising since the information had already been anticipated by the market.

Note that September 29, 1998 (day -12) shows a significant drop in cumulative returns. This is due to the fact that on this day the Fed cut the interest rate by 25 basis points for the first time since 1996. Investors were disappointed, believing that the Fed didn’t cut the federal funds rate enough, and the market was anticipating a much higher decrease of the

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interest rate (*The Wall Street Journal* and *The New York Times*).

One question concerning the over 20% cumulative mean abnormal returns within a month may be too high in some industries (such as Computer and related equipment, Computer data processing services, Electrical machinery, equipment and supplies). One way to address this issue is to use weighted returns. Cowan (2003) defines the weighted cumulative abnormal returns from T_1 to T_2 as

$$WCAR_{T_1,T_2} = \sum_{j=1}^{N} \sum_{t=T_1}^{T_2} w_j AR_{jt},$$

and

$$w_j = \frac{(\sum_{t=T_1}^{T_2} s_{AR_{jt}}^2)^{-\frac{1}{2}}}{\sum_{i=1}^{N} (\sum_{t=T_1}^{T_2} s_{AR_{it}}^2)^{-\frac{1}{2}}}$$

where s_{AR}^2 is the variance of abnormal returns. I report the weighted and unweighted cumulative mean abnormal returns of five different windows in Table 4. When using weighted returns, the cumulative mean abnormal returns of Computer and related equipment, Computer data processing services, Electrical machinery, equipment and supplies drop to 15.88%, 18.11% and 15.68%, respectively.

In sum, the AWCIA of 1998 had a positive impact on the returns of top H-1B user industries. Shareholders of high-tech companies (top users of H-1B visa, 80% of total) such as Computers and related equipment, Computer and data processing services enjoyed an average 21.54% and 22.77% cumulative excess return in the month after the Act was passed. On the other hand, shareholders of non-high-tech industries (remaining balance of H-1B visa) such as Security, commodity brokerage, and investment companies had a 4% lower average cumulative excess in the same period.

Robustness

1. Industry with Little Need for H-1B Visas

Figure 4 shows the patterns of mean abnormal returns and cumulative mean abnormal returns of industries with little need for H-1B visas. These industries can be used to

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compare my findings in the last section. Under the same time window, the patterns are different compared to the top H-1B user industries in Figure 3[16]. In other words, the ACWIA of 1998 has no significant effect on industries with little need for H-1B visas as shown in Table 5. These industries include Farm-product raw materials, Nonmetallic mining and quarrying except fuels, Sawmills, planning mills and millwork, Metal mining and Bowling centers, etc. Detailed estimation results are reported in Table A20 to Table A24.

[16] Note that some industries hire both large numbers of skilled and low-skilled immigrants. For example, hospitals, hotels and motels, all construction and eating and drinking places. Hence, for comparison, using the industries that hire large number of medium-skilled or low-skilled immigrants may misinterpret the results.

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2. International Condition - Canada, UK and Germany

One could attribute the increased abnormal returns to international macroeconomic condition. Hence, it is useful to compare across countries. In Table 6 and Figure 5, I report the results of mean abnormal returns and cumulative means abnormal return of high-tech industries in Canada, U.K. and Germany during the same time window. The data for Canada are from Canadian Financial Market Research Centre (CFMRC), U.K. and Germany data are from Global Financial Data. Two U.S. computer industries are for comparisons.

Figure 5 shows that high-tech industries in Canada, U.K. and Germany do not have significant and increasing patterns after the event day of October 15, 1998. In particular, Canada is often regarded as a highly-correlated market with the U.S. For European markets, the IT sector in U.K. does not show an increasing trend of cumulative abnormal returns and the German market shows mixed results (not as consistent as US high-tech industries) after the event day. Hence, the doubt that the significant and positive abnormal returns might be driven by international condition can be ruled out.

3. Nonparametric (Semiparametric) Model[17]

One crucial question about the financial market is that financial data are generally not normally distributed. In particular, financial return distributions are often characterized as fat-tailed and skewed in empirical research. To address this issue, I use a semiparametric least squares model without assuming the functional form of right hand side variables to estimate the return generating process. The model is

$$Y_i = G(X_i\beta_0) + \varepsilon_i \qquad (5)$$

where G is some unknown function, $E(\varepsilon_i \mid X_i) = 0$ and $E(Y_i \mid X_i) = G(X_i\beta_0)$. Then, the least squares estimates can be found by

$$\underset{\beta}{Min} \sum [Y_i - G(X_i\beta)]^2 \qquad (6)$$

Hence, the abnormal return can be obtained by getting the conditional expectation

[17] Besides the benchmark single factor market model and semiparametric model, I estimate the normal returns by multi-factor modeling using Fama and French (1993) three factors and Fama-French-momentum four factors. The results are reported in Chapter 2.

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$E(Y_i \mid X_i)$ after subtracting it from Y_i. In other words, the abnormal return (prediction error) is

$$AR_{it} = Y_{it} - \hat{G}(\beta) \quad (7)$$

Figure 6 shows the results of this model. From the pattern of the graphs, the semiparametric least squares model catches the abnormal returns very well. It shows the top H-1B visa user industries have rising cumulative mean abnormal returns after the day when the ACWIA of 1998 was passed in the Senate.

4. Testing Structural Breaks

I apply the work by Doornik and Hendry (1997) using break-point Chow test and sample-split Chow test to test for structural change. By assuming that a structural break may have occurred in period T_B, the sample-split and break-point Chow tests compare the estimates from the observations associated with the period before T_B with those obtained after T_B. More precisely, the model is estimated by OLS from the full sample of T observations as well as from the first T_1 and the last T_2 observations, where $T_1 < T_B$ and $T_2 \leq T - T_B$.

The sample-split test statistics is

$$\lambda_{SS} = (T_1 + T_2)[\log \hat{\sigma}^2_{1,2} - \log\{(T_1 + T_2)^{-1}(T_1\hat{\sigma}^2_{(1)} + T_2\hat{\sigma}^2_{(2)})\}],$$

and the break-point test statistics is

$$\lambda_{BP} = (T_1 + T_2)\log \hat{\sigma}^2_{1,2} - T_1 \log \hat{\sigma}^2_{(1)} - T_2 \log \hat{\sigma}^2_{(2)}.$$

These test statistics compare the residual variance estimate from a constant coefficient model with the residual variance estimate of a model that allows for a change in the parameters. As such, they check whether there are significant differences in the estimates before and after T_B. The sample-split test checks the null hypothesis that the

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AR coefficients and deterministic terms do not change during the sample period, whereas the break-point test checks in addition the constancy of the white noise variance.

By searching every data point, I perform the two Chow tests not only for a single break date but over a range of the time points. Figure 7 provides the results graphically by using bootstrapped p-values with 2,000 replications. It is obvious that Computer and related equipment industry has a break point on the event day. Management and public relation services industry also has a break point on the event day.

VI. Concluding Remarks

Immigration is a contentious issue in the industrialized nations of the world. Many of the key questions in the debate on immigration policy are economic. Most attention has been paid to the potential adverse effect and possible benefits of immigration on labor market outcomes of employees (Friedberg and Hunt (1995)). Less attention, however, is devoted to the consequences of immigration on employers. This paper uses event study analysis to measure the economic impact of immigration policy on the profit of employers and shareholders. The American Competitiveness and Workforce Improvement Act (ACWIA) of 1998 nearly doubled the available number of H-1B visas for skilled foreign workers in FY 1999. It was the first time that the U.S. government raised the annual cap of H-1B visa since 1990. I focus on this bill and analyze whether and by how much it increased shareholders' profit.

The empirical results show that employers and shareholders in the top H-1B visa user industries enjoyed significant and positive abnormal returns with the passage of the ACWIA of 1998. High-tech industries (top users of H-1B visa, 80% of total) such as "Computers and related equipment", and "Computer and data processing services" gained, respectively, an average 21.54% and 22.77% in cumulative abnormal returns in the month with the passage of the Act. Using weighted returns, the estimated mean cumulative abnormal returns are 15.88% for "Computers and related equipment" and 18.11% for and "Computer and data processing services industries", respectively. Industries with little need for H-1B visas experienced no significant changes in cumulative abnormal returns. Robustness checks which include controlling for international condition, semiparametric modeling, sample-split and break-point Chow tests support the results.

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In sum, top H-1B visa user industries benefited from the passage of the skilled immigration policy - the ACWIA of 1998. Raising H-1B visa cap had a positive and significant impact on the returns of top H-1B visa user industries. This paper contributes to the literature by answering the quantitative effect of immigration policy on employers. In fact, top H-1B visa user industries gained more than the increased 50,000 visas in FY 1999. Not only had their profits increased, but also acquired skilled workers which can enhance productivity of the firm. In other words, hiring more skilled foreign workers helps U.S. industries improve their international competitiveness. It has the policy implication that if the skilled foreign workers and domestic U.S. workers are complement, when these high-skilled jobs are brought to the U.S., other jobs related to them may be created and filled by U.S. citizens. The results can be applied to other industries such as pharmaceutical companies and hospitals. My findings can help policymakers evaluate immigration policy from the perspective of employers.

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Table 2 H-1B Petitions Approved by Detailed Industry: FY 2001-2008

Industry	FY 2001		FY 2002		FY 2003		FY 2004	
	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent
Total	181,722	100.0	93,227	100.0	94,615	100.0	119,899	100.0
Computer systems design and related services	84,853	46.7	16,714	17.9	19,347	20.4	46,573	38.8
College, universities, and professional schools	9,817	5.4	11,989	12.9	13,116	13.9	12,674	10.6
Management, scientific, and technical consulting services	7,800	4.3	4,081	4.4	5,023	5.3	5,004	4.2
Architectural, engineering, and related services	8,087	4.5	5,407	5.8	4,589	4.9	4,589	4.2
Telecommunications	4,928	2.7	1,798	1.9	1,022	1.1	1,092	0.9
Scientific research and development services	4,173	2.3	4,187	4.5	3,818	4.0	3,648	3.0
Semiconductor and other electronic component manufacturing	3,330	1.8	1,396	1.5	1,084	1.1	1,307	1.1
Communications equipment manufacturing	2,537	1.4	721	0.8	353	0.4	512	0.4
Accounting, tax preparation, bookkeeping, and payroll services	2,678	1.5	2,161	2.3	2,160	2.3	2,672	2.2
Securities and commodity contracts intermediation and brokerage	2,074	1.1	1,598	1.7	1,294	1.4	2,057	1.7
Computer and electronic product manufacturing	1,682	0.9	480	0.5	346	0.4	331	0.3
Information services	1,482	0.8	613	0.7	n/a	n/a	n/a	n/a
Computer and peripheral equipment manufacturing	1,494	0.8	814	0.9	470	0.5	593	0.5
Other Industries	46,787	26	41,268	44	41,993	44	38,847	32

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Table 2 H-1B Petitions Approved by Detailed Industry: FY 2001-2008 (continued)

Industry	FY 2005		FY 2006		FY 2007		FY 2008	
	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent
Total	108,674	100.0	103,794	100.0	113,868	100.0	109,335	100.0
Computer systems design and related services	43,831	40.3	48,073	46.3	56,505	49.6	52,829	48.3
College, universities, and professional schools	12,995	12.0	11,279	10.9	11,413	10.0	11,318	10.4
Management, scientific, and technical consulting services	4,822	4.4	5,383	5.2	3,460	3.0	3,008	2.8
Architectural, engineering, and related services	4,738	4.4	3,746	3.6	4,377	3.8	3,557	3.3
Telecommunications	652	0.6	392	0.4	n/a	n/a	n/a	n/a
Scientific research and development services	3,203	2.9	2,906	2.8	2,962	2.6	2,414	2.2
Semiconductor and other electronic component manufacturing	1,639	1.5	1,801	1.7	1,711	1.5	1,337	1.2
Communications equipment manufacturing	490	0.5	326	0.3	560	0.5	341	0.3
Accounting, tax preparation, bookkeeping, and payroll services	2,501	2.3	2,271	2.1	1,820	1.6	1,550	1.4
Securities and commodity contracts intermediation and brokerage	1,750	1.6	1,869	1.8	1,906	1.7	1,797	1.6
Genial medical and surgical hospitals	2,234	2.1	2,501	2.4	2,816	2.5	2,660	2.4
Other financial investment activities	794	0.7	651	0.6	774	0.7	784	0.7
Computer and peripheral equipment manufacturing	601	0.6	451	0.4	870	0.8	888	0.8
Other Industries	28,424	26.1	22,145	21.5	24,694	21.7	26,852	24.6

Source: *Report on Characteristics of Specialty Occupation Workers (H-1B): FY 2001-2008*, USCIS.

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Table 3 Estimation Results of Top H-1B Visa User Industries

Industry	Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test	Firms
Computers and related equipment	(-30,0)	47	-0.09%	-2.83%	25:22	-0.413	-0.284	-0.697	0.847	Apple, Sprint, Seagate,
	(+1,+30)	47	0.72%	21.54%	36:11	6.618***	4.748***	5.396***	4.062***	Lexmark, Gateway, etc.
Computer and data processing services	(-30,0)	584	-0.27%	-8.33%	220:364	-7.821***	-6.535***	-1.968*	-3.983***	Oracle, Microsoft, Compaq,
	(+1,+30)	584	0.76%	22.77%	423:161	18.958***	12.972***	5.469***	12.875***	Yahoo, Novell, Sandata, etc.
Research, development and testing services	(-30,0)	81	0.17%	5.17%	44:37	1.827*	1.315$	1.272	1.191	Atlantic Pharmaceuticals, Pacific Biometrics, Megabios, Opinion Research, Pharmchem, etc.
	(+1,+30)	81	0.52%	15.69%	58:23	6.075***	4.318***	3.925***	4.305***	
Electrical machinery, equipment and supplies	(-30,0)	346	-0.04%	-1.26%	163:183	-1.797*	-1.549$	-0.315	-0.124	Texas Instruments, Emerson Electric, Bell Industries, Integrated Device Technology,
	(+1,+30)	346	0.82%	24.49%	277:69	20.482***	12.819***	6.243***	12.149***	
Management and public relations services	(-30,0)	52	-0.30%	-9.31%	24:28	-3.794***	-1.988*	-2.364**	0.034	Randers Group, Market Facts, Dental Care Alliance, Right Management Consultants, etc.
	(+1,+30)	52	0.44%	13.19%	34:18	4.731***	3.517***	3.404***	2.816**	
Engineering, architectural and surveying services	(-30,0)	24	-0.09%	-2.79%	9:15	-1.669*	-1.559$	-0.396	-0.683	Cam Designs, Waste Systems International, Wavetech, etc.
	(+1,+30)	24	0.81%	24.13%	19:5	4.329***	3.924***	3.478***	3.425***	
Security, commodity brokerage and investment companies	(-30,0)	1363	-0.07%	-2.05%	701:662	-3.322***	-2.657**	-1.383$	3.686***	Smith Barney, Sovereign Bancorp, Fidelity Bancorp, etc.
	(+1,+30)	1363	0.13%	4.00%	823:540	12.477***	11.725***	2.750**	10.312***	

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test.

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Table 4 Weighted and Unweighted Cumulative Mean Abnormal Returns

Industry		(-30,0)	(+1,+5)	(+1,+10)	(+1,+20)	(+1,+30)
Computers and related equipment	Mean Abnormal Return	-0.09%	1.46%	1.07%	0.93%	0.72%
	Cumulative Abnormal Return	-2.83%	7.28%	10.71%	18.54%	21.54%
	Weighted Cumulative Abnormal Return	-1.08%	5.24%	8.25%	13.68%	15.88%
Computer and data processing services	Mean Abnormal Return	-0.27%	1.28%	1.17%	0.98%	0.76%
	Cumulative Abnormal Return	-8.33%	6.39%	11.67%	19.58%	22.77%
	Weighted Cumulative Abnormal Return	-7.52%	5.86%	10.59%	16.59%	18.11%
Research, development and testing services	Mean Abnormal Return	0.17%	0.23%	0.79%	0.76%	0.52%
	Cumulative Abnormal Return	5.17%	1.15%	7.88%	15.22%	15.70%
	Weighted Cumulative Abnormal Return	4.18%	2.51%	8.65%	13.92%	14.10%
Electrical machinery, equipment and supplies	Mean Abnormal Return	-0.04%	1.54%	1.61%	1.18%	0.82%
	Cumulative Abnormal Return	-1.26%	7.69%	16.10%	23.51%	24.56%
	Weighted Cumulative Abnormal Return	-1.96%	7.30%	14.65%	20.83%	21.42%
Management and public relations services	Mean Abnormal Return	-0.30%	0.92%	0.96%	0.54%	0.44%
	Cumulative Abnormal Return	-9.31%	4.60%	9.57%	10.84%	13.20%
	Weighted Cumulative Abnormal Return	-8.99%	4.21%	8.41%	10.44%	11.37%
Engineering, architectural and surveying services	Mean Abnormal Return	-0.09%	0.00%	1.20%	1.08%	0.81%
	Cumulative Abnormal Return	-2.79%	0.01%	11.97%	21.58%	24.15%
	Weighted Cumulative Abnormal Return	-6.36%	3.02%	8.08%	15.00%	15.68%
Security, commodity brokerage and investment companies	Mean Abnormal Return	-0.07%	0.41%	0.31%	0.21%	0.13%
	Cumulative Abnormal Return	-2.05%	2.05%	3.08%	4.22%	4.00%
	Weighted Cumulative Abnormal Return	-0.44%	1.53%	2.09%	3.06%	2.71%

Source: Numbers are compiled by author.

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Table 5 Estimation Results of Industries with Little Need for H-1B Visas

Industry	Day	Mean Abnormal Return	Cumulative Mean Abnormal Return	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test	Firms
Metal Mining	(-30,0)	1.01%	31.45%	13.022***	8.984***	3.764***	7.733***	Alanco Environmental Resources Corp., Sunshine Mining & Refining Corp., etc.
	(+1,+30)	0.17%	5.09%	0.643	0.495	0.628	-0.446	
Logging	(-30,0)	-0.07%	-2.32%	-0.506	-0.365	-0.428	-0.678	Crown Pacific Partners, Deltic Timber Corp., Alliance Forest Products Inc.
	(+1,+30)	0.51%	15.28%	3.131***	1.458$	2.908**	1.635$	
Bowling centers	(-30,0)	-0.22%	-6.72%	-0.512	-0.512	-0.562	-0.739	Bowl America Inc., etc.
	(+1,+30)	-0.14%	-4.33%	-0.335	-0.335	-0.368	-0.739	
Wood building and mobile homes	(-30,0)	-0.09%	-2.87%	-1.145	-0.799	-0.469	0.024	Midland Company, Lindal Cedar Homes Inc., Liberty Homes Inc., etc.
	(+1,+30)	0.07%	2.04%	0.507	0.457	0.34	0.024	
Farm supplies	(-30,0)	-0.77%	-23.95%	-2.092*	-2.092*	-2.143*	-0.899	Pioneer Hi Bred Intl Inc.
	(+1,+30)	0.12%	3.46%	0.306	0.306	0.314	1.112	
Sawmills, planning mills and workmills	(-30,0)	0.34%	10.41%	1.872*	1.883*	1.688*	2.064*	Pope & Talbot Inc., Rayonier Inc., Reed International Plc., etc.
	(+1,+30)	0.06%	1.67%	0.349	0.726	0.275	1.063	
Nonmetallic mining and quarrying, except fuels	(-30,0)	0.60%	18.56%	0.912	0.586	1.531$	0.531	Canyon Resources Corp., De Beers Cons Mines Ltd., Calmat Co., etc.
	(+1,+30)	-0.07%	-2.04%	0.055	0.022	-0.174	0.531	
Farm-products raw materials	(-30,0)	0.10%	3.13%	0.355	0.184	0.476	0.517	Universal Corporation, Standard Commercial Corp., Dimon Inc.
	(+1,+30)	-0.12%	-3.69%	-0.427	-0.222	-0.578	-0.639	
Fishing, hunting, and trapping	(-30,0)	-0.90%	-27.75%	-1.885*	-1.885*	-3.220***	-0.824	Omega Protein Corp.
	(+1,+30)	0.34%	10.23%	0.708	0.708	1.209	1.213	

Table 6 Abnormal Returns and Cumulative Mean Abnormal Returns of High-tech Industries in U.S., Canada, U.K. and Germany

		U.S.					Canada				
		(-30,0)	(+1,+5)	(+1,+10)	(+1,+20)	(+1,+30)	(-30,0)	(+1,+5)	(+1,+10)	(+1,+20)	(+1,+30)
Computers and related equipment	**AR**	-0.09%	1.46%	1.07%	0.93%	0.72%	-0.86%	-0.12%	0.59%	0.34%	0.48%
	CAR	-2.83%	7.28%	10.71%	18.54%	21.54%	-26.61%	-0.59%	5.85%	6.73%	14.30%
Computer and data processing services	**AR**	-0.27%	1.28%	1.17%	0.98%	0.76%	-0.34%	-0.61%	-0.05%	-0.12%	-0.08%
	CAR	-8.33%	6.39%	11.67%	19.58%	22.77%	-10.61%	-3.04%	-0.47%	-2.34%	-2.33%
		U.K.					**Germany**				
Information Technology	**AR**	-0.68%	-0.14%	0.31%	-0.11%	0.05%	-0.32%	-0.02%	0.43%	0.73%	0.51%
	CAR	-20.94%	-0.72%	3.12%	-2.19%	1.60%	-9.86%	-0.08%	4.30%	14.57%	15.31%
Telecommunication	**AR**	-0.19%	0.11%	0.20%	0.13%	0.13%	0.26%	-1.75%	-1.57%	-0.81%	-0.44%
	CAR	-5.90%	0.53%	1.98%	2.55%	3.97%	8.20%	-8.74%	-15.67%	-16.24%	-13.20%

Source: Numbers are compiled by author.

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Figure 3 Mean Abnormal Return and Cumulative Mean Abnormal Return of Top H-1B Visa User Industries

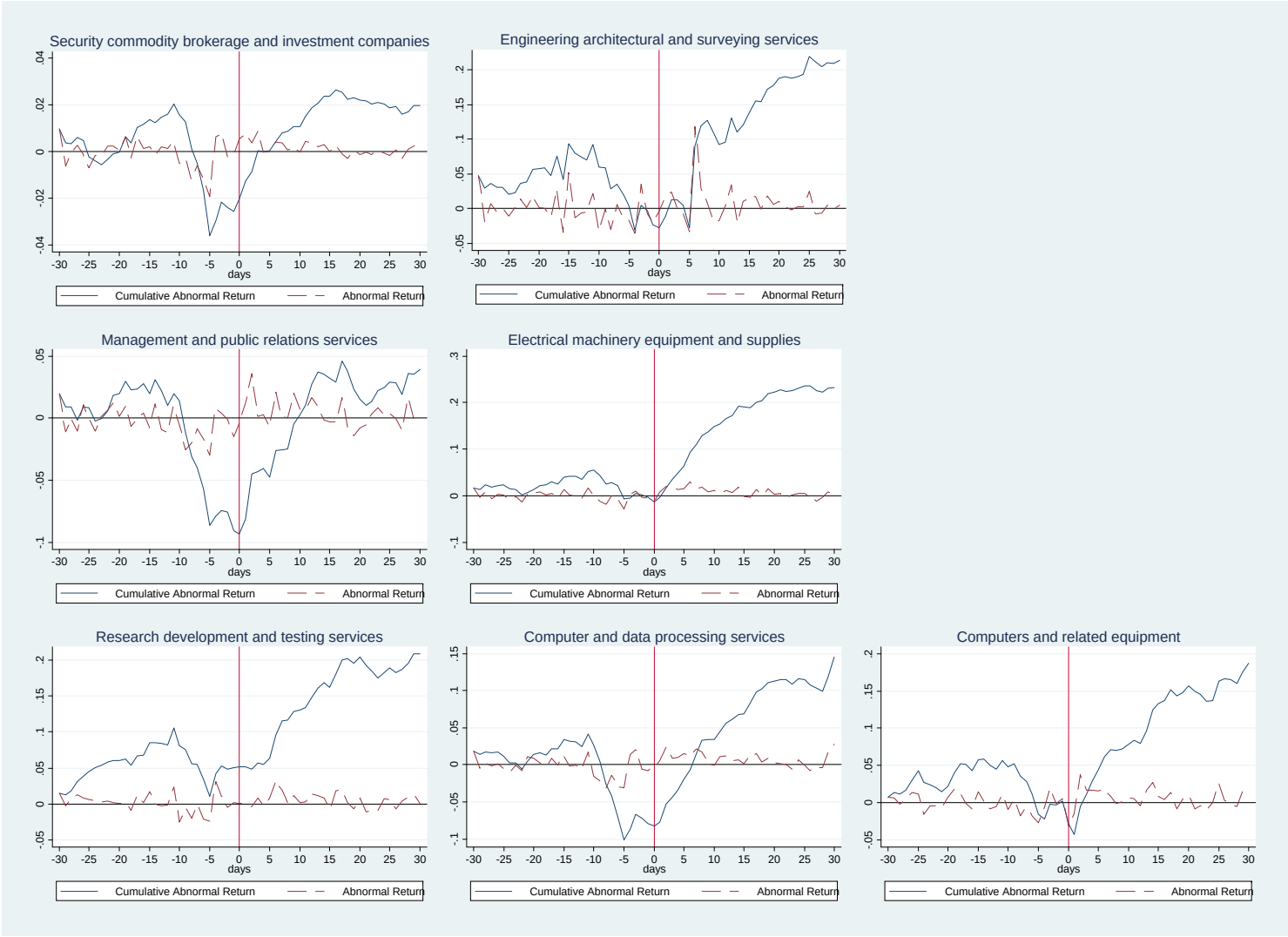

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Figure 4 Mean Abnormal Returns and Cumulative Mean Abnormal Returns of Industries with Little Need for H-1B Visas

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Figure 5 Mean Abnormal Returns and Cumulative Mean Abnormal Returns of High-tech industries in U.S., Canada, U.K. and Germany

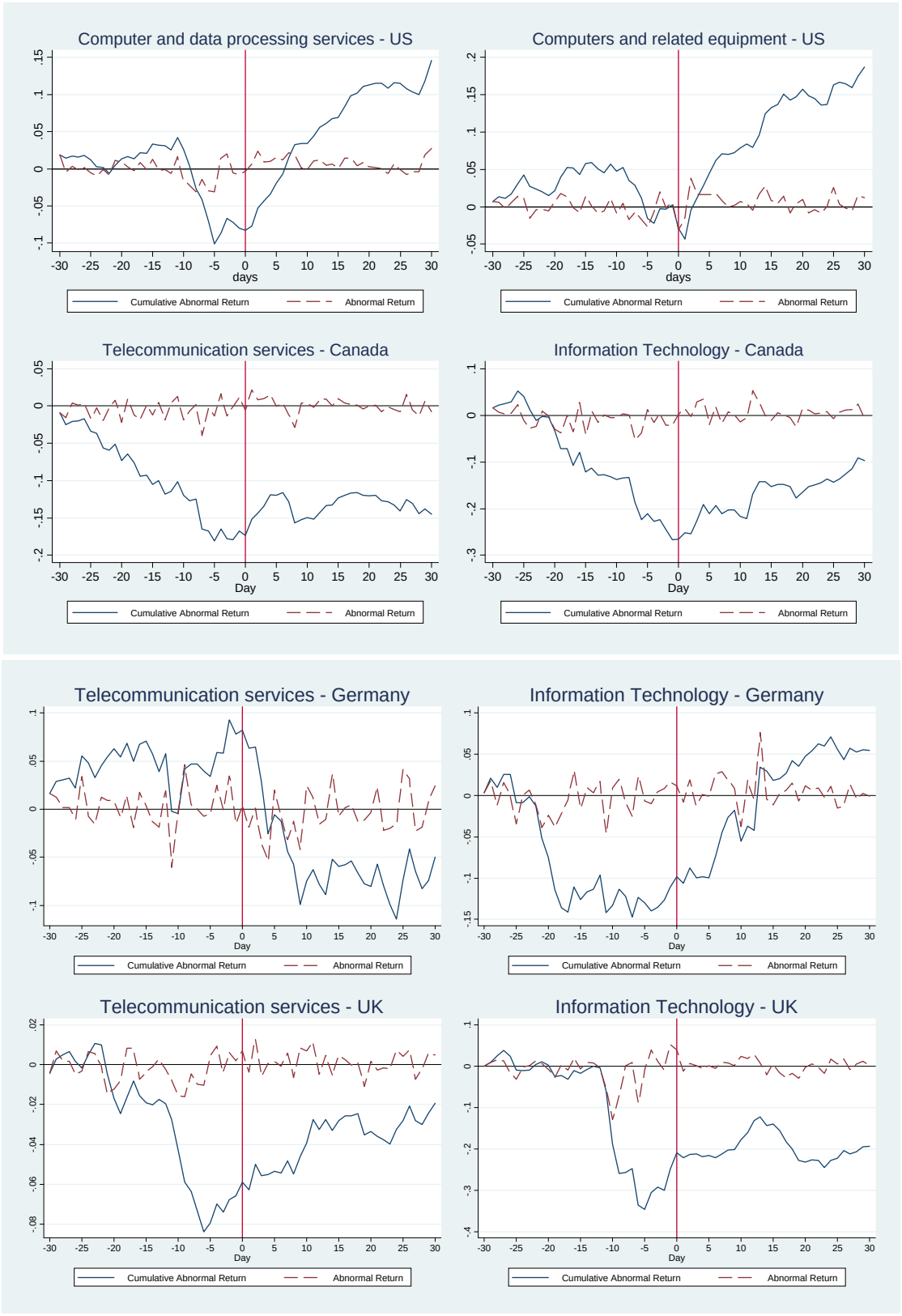

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Figure 6 Mean Abnormal Returns and Cumulative Mean Abnormal Returns of Semiparametric Model

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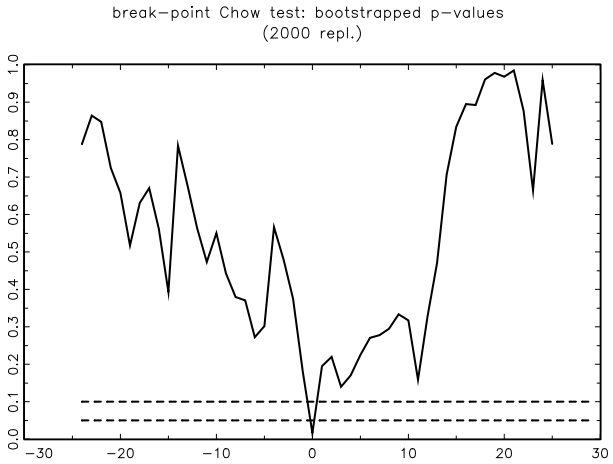
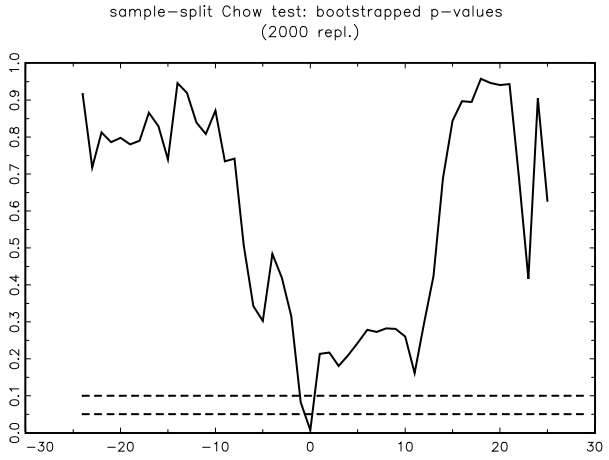
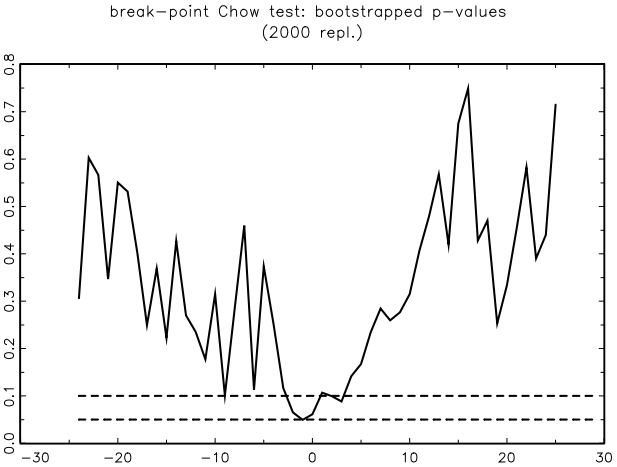
Figure 7 Structural Break Tests

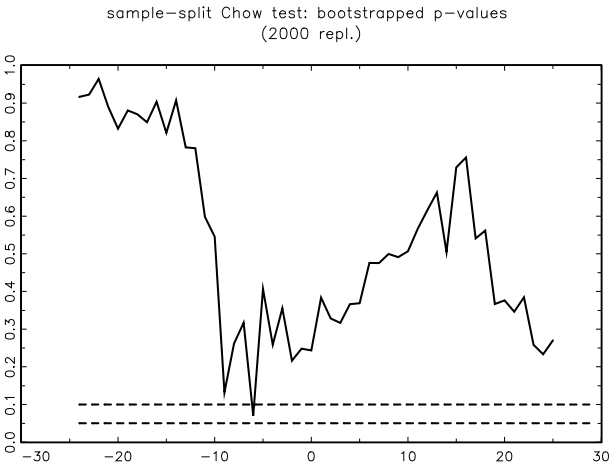
1. Computers and related equipment





2. Computer and data processing services





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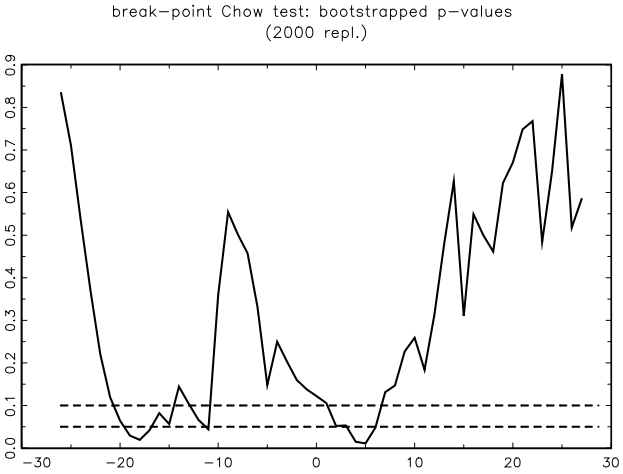
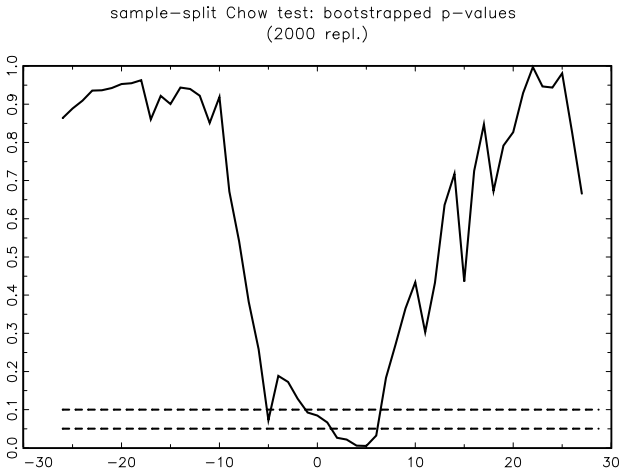
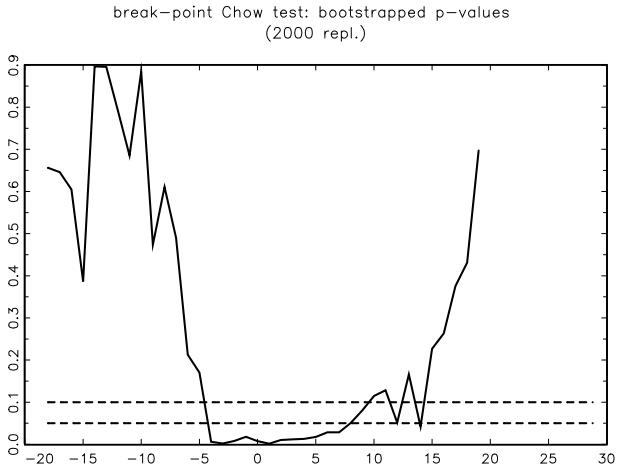
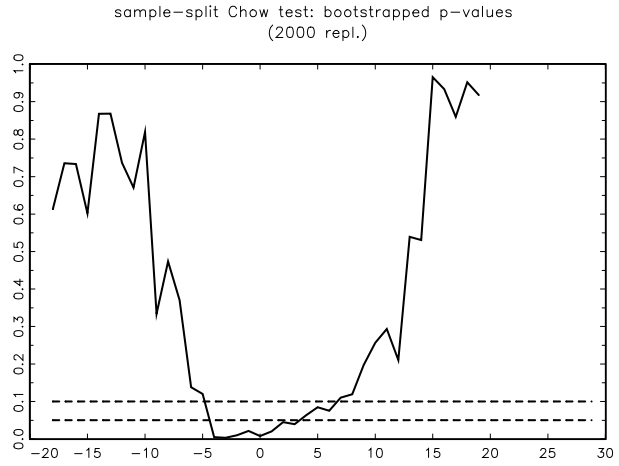
3. Research, development, and testing services





4. Electrical machinery, equipment, and supplies





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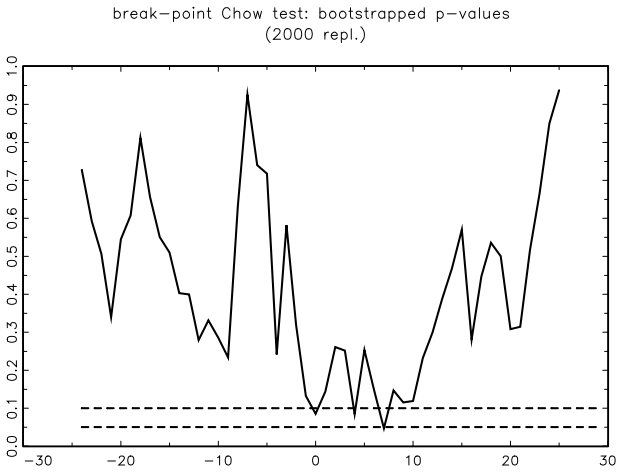
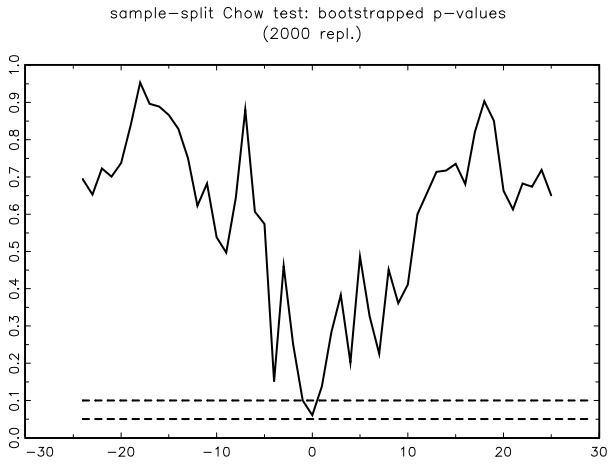
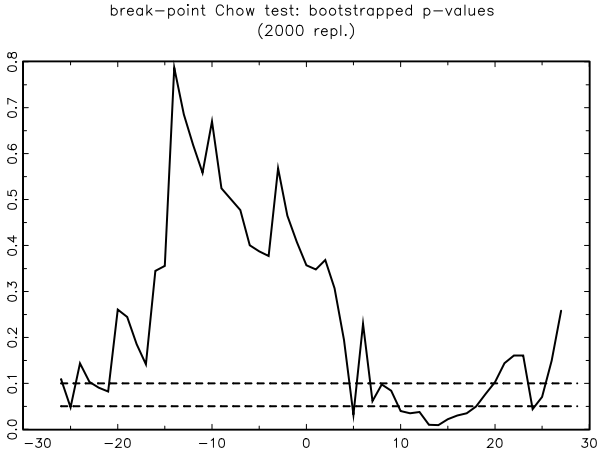
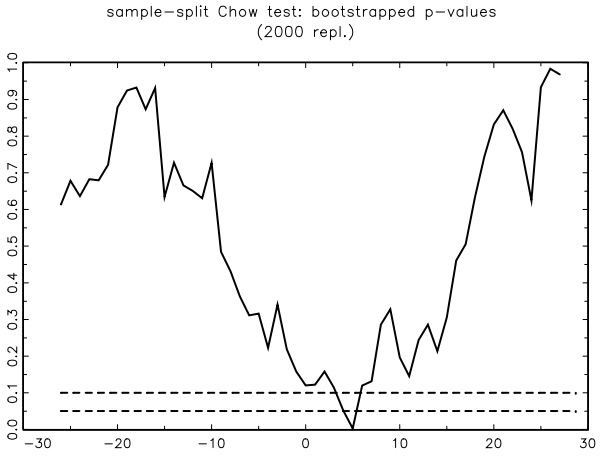
5. Management and public relations services





6. Engineering, architectural, and surveying services





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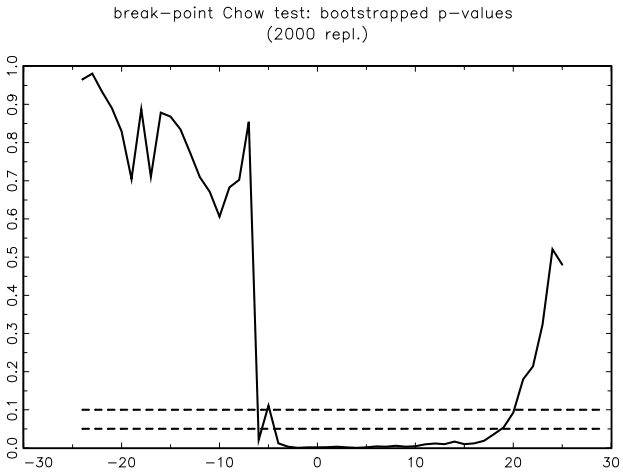
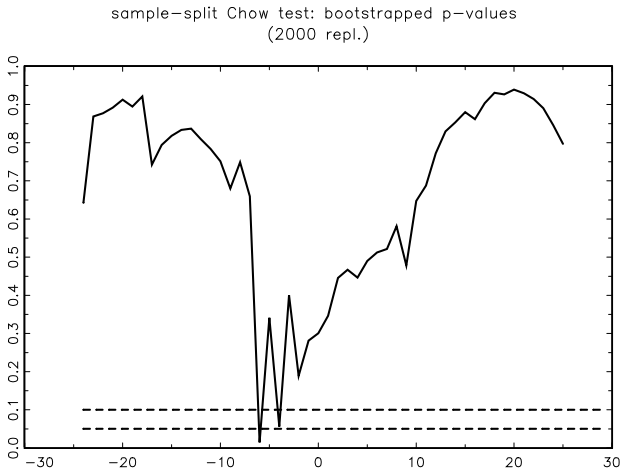
7. Security, commodity brokerage, and investment companies





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Appendix

Table A1 H-1B Petitions Approved by Major Occupation Group of Beneficiary: FY2000

Occupation	Total*	Percent
Total	135,362	100.0
Computer-related	74,551	55.1
Architecture, engineering, and surveying	17,086	12.6
Administrative specializations	11,468	8.5
Education	7,210	5.3
Medicine and health	4,734	3.5
Managers and officials	4,366	3.2
Others (11 occupations)	15,947	15.8

Note: the total is the initial employment, not continuing employment.
Source: *Report on Characteristics of Specialty Occupation Workers (H-1B): FY 2000*, USCIS.

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Table A2 H-1B Petitions Approved by Detailed Industry: FY 2001-2008

Industry	FY 2001		FY 2002		FY 2003		FY 2004	
	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent
Total	181,722	100.0	93,227	100.0	94,615	100.0	119,899	100.0
Computer systems design and related services	84,853	46.7	16,714	17.9	19,347	20.4	46,573	38.8
College, universities, and professional schools	9,817	5.4	11,989	12.9	13,116	13.9	12,674	10.6
Management, scientific, and technical consulting services	7,800	4.3	4,081	4.4	5,023	5.3	5,004	4.2
Architectural, engineering, and related services	8,087	4.5	5,407	5.8	4,589	4.9	4,589	4.2
Telecommunications	4,928	2.7	1,798	1.9	1,022	1.1	1,092	0.9
Scientific research and development services	4,173	2.3	4,187	4.5	3,818	4.0	3,648	3.0
Semiconductor and other electronic component manufacturing	3,330	1.8	1,396	1.5	1,084	1.1	1,307	1.1
Communications equipment manufacturing	2,537	1.4	721	0.8	353	0.4	512	0.4
Accounting, tax preparation, bookkeeping, and payroll services	2,678	1.5	2,161	2.3	2,160	2.3	2,672	2.2
Securities and commodity contracts intermediation and brokerage	2,074	1.1	1,598	1.7	1,294	1.4	2,057	1.7
Computer and electronic product manufacturing	1,682	0.9	480	0.5	346	0.4	331	0.3
Information services	1,482	0.8	613	0.7	n/a	n/a	n/a	n/a
Computer and peripheral equipment manufacturing	1,494	0.8	814	0.9	470	0.5	593	0.5
Other Industries	46,787	26	41,268	44	41,993	44	38,847	32

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Table 2 H-1B Petitions Approved by Detailed Industry: FY 2001-2008 (continued)

Industry	FY 2005		FY 2006		FY 2007		FY 2008	
	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent	Initial Employment	Percent
Total	108,674	100.0	103,794	100.0	113,868	100.0	109,335	100.0
Computer systems design and related services	43,831	40.3	48,073	46.3	56,505	49.6	52,829	48.3
College, universities, and professional schools	12,995	12.0	11,279	10.9	11,413	10.0	11,318	10.4
Management, scientific, and technical consulting services	4,822	4.4	5,383	5.2	3,460	3.0	3,008	2.8
Architectural, engineering, and related services	4,738	4.4	3,746	3.6	4,377	3.8	3,557	3.3
Telecommunications	652	0.6	392	0.4	n/a	n/a	n/a	n/a
Scientific research and development services	3,203	2.9	2,906	2.8	2,962	2.6	2,414	2.2
Semiconductor and other electronic component manufacturing	1,639	1.5	1,801	1.7	1,711	1.5	1,337	1.2
Communications equipment manufacturing	490	0.5	326	0.3	560	0.5	341	0.3
Accounting, tax preparation, bookkeeping, and payroll services	2,501	2.3	2,271	2.1	1,820	1.6	1,550	1.4
Securities and commodity contracts intermediation and brokerage	1,750	1.6	1,869	1.8	1,906	1.7	1,797	1.6
Genial medical and surgical hospitals	2,234	2.1	2,501	2.4	2,816	2.5	2,660	2.4
Other financial investment activities	794	0.7	651	0.6	774	0.7	784	0.7
Computer and peripheral equipment manufacturing	601	0.6	451	0.4	870	0.8	888	0.8
Other Industries	28,424	26.1	22,145	21.5	24,694	21.7	26,852	24.6

Source: *Report on Characteristics of Specialty Occupation Workers (H-1B): FY 2001-2008*, USCIS.

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Table A3 Source of Region 1980, 1990 and 2000

	1980	1990	2000
North America	133,260	196,584	283,560
%	6.87	4.78	4.21
Mexico	83,180	257,604	568,068
%	4.29	6.26	8.44
Central America	48,900	154,085	255,313
%	2.52	3.74	3.79
Caribbean	177,320	390,040	610,927
%	9.14	9.48	9.07
South America	100,960	259,581	462,951
%	5.21	6.31	6.87
Europe	617,360	1,004,017	1,482,663
%	31.84	24.39	22.02
East Asia	208,240	519,002	882,458
%	10.74	12.61	13.1
Southeast Asia	238,420	590,888	975,271
%	12.3	14.36	14.48
India/Southwest Asia	129,000	322,634	674,796
%	6.65	7.84	10.02
Middle East/Asia Minor	43,060	99,667	153,298
%	2.22	2.42	2.28
Other Asia	140	802	0
%	0.01	0.02	0
Africa	54,800	156,421	331,626
%	2.83	3.8	4.92
Oceania, Antarctica and others	104,480	164,862	53,024
%	5.39	4.01	0.79
Total	1,939,120	4,116,187	6,733,955
%	100.00	100.00	100.00

Source: Number and percentage are compiled by the author.
Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A4 Source of Region 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
North America	302,170	292,471	298,042	289,057	309,776	309,742	312,706	309,617
%	4.11	3.8	3.78	3.6	3.67	3.44	3.43	3.29
Mexico	685,811	713,641	797,585	810,920	853,964	928,615	946,154	1,061,396
%	9.32	9.28	10.12	10.11	10.11	10.32	10.36	11.29
Central America	303,247	334,595	321,130	336,035	376,344	401,361	398,985	454,430
%	4.12	4.35	4.07	4.19	4.46	4.46	4.37	4.83
Caribbean	680,179	706,297	763,257	748,774	761,863	809,239	837,470	876,466
%	9.24	9.18	9.68	9.34	9.02	8.99	9.17	9.32
South America	554,831	592,090	614,723	614,455	685,879	712,705	721,708	740,908
%	7.54	7.7	7.8	7.66	8.12	7.92	7.9	7.88
Europe	1,483,286	1,534,924	1,523,439	1,554,640	1,611,967	1,674,441	1,694,146	1,695,488
%	20.16	19.96	19.32	19.38	19.09	18.6	18.56	18.03
East Asia	978,013	1,000,316	1,001,283	1,000,737	1,064,082	1,136,452	1,124,652	1,033,824
%	13.29	13.01	12.7	12.48	12.6	12.62	12.32	10.99
Southeast Asia	977,517	1,099,541	1,103,525	1,096,502	1,162,602	1,268,697	1,266,739	1,372,166
%	13.28	14.3	14	13.67	13.77	14.09	13.87	14.59
India /Southwest Asia	763,889	774,588	858,368	853,893	905,259	1,016,655	1,014,307	1,034,631
%	10.38	10.07	10.89	10.65	10.72	11.29	11.11	11
Middle East /Asia Minor	167,289	175,905	175,378	175,957	167,792	175,634	194,295	189,435
%	2.27	2.29	2.22	2.19	1.99	1.95	2.13	2.01
Other Asia	19,026	12,402	11,395	16,627	16,945	18,841	20,436	18,713
%	0.26	0.16	0.14	0.21	0.2	0.21	0.22	0.2
Africa	380,511	395,000	357,899	463,433	465,469	492,997	523,153	548,123
%	5.17	5.14	4.54	5.78	5.51	5.48	5.73	5.83
Oceania, Antarctica and others	62,764	58,816	57,573	59,758	62,629	56,392	75,271	67,711
%	0.85	0.76	0.73	0.75	0.74	0.63	0.82	0.72
Total	7,358,533	7,690,586	7,883,597	8,020,788	8,444,571	9,001,771	9,130,022	9,402,908
%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Number and percentage are compiled by the author. Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A5 Occupation: 1980, 1990 and 2000 (General)

	1980	1990	2000
Managerial and Professional Specialty	885,400	1,745,829	3,040,794
%	45.56	42.2	44.99
Technical, Sales, and Administrative Support	587,340	1,338,757	2,065,588
%	30.22	32.36	30.56
Service	150,960	382,384	660,504
%	7.77	9.24	9.77
Farming, Forestry, and Fishing	9,600	21,670	34,598
%	0.49	0.52	0.51
Precision Production, Craft, and Repair	136,080	271,989	425,412
%	7	6.58	6.29
Operators, Fabricators, and Laborers	146,380	324,633	482,531
%	7.53	7.85	7.14
Military	27,540	51,346	48,776
%	1.42	1.24	0.72
Total	1,943,300	4,136,608	6,758,203
%	100.00	100.00	100.00

Source: Number and percentage are compiled by the author.
Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A6 Occupation (General) 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
Managerial and Professional Specialty	3,198,388	3,442,101	3,533,082	3,579,870	3,807,635	4,023,614	4,158,398	4,016,189
%	43.29	44.57	44.65	44.47	44.92	44.52	45.36	42.53
Technical, Sales, and Administrative Support	2,273,728	2,300,735	2,315,046	2,401,832	2,437,981	2,612,887	2,616,122	2,763,977
%	30.77	29.79	29.26	29.83	28.76	28.91	28.54	29.27
Service	803,510	815,817	881,228	885,593	983,712	1,063,496	1,061,314	1,210,219
%	10.88	10.56	11.14	11	11.6	11.77	11.58	12.82
Farming, Forestry, and Fishing	46,751	52,501	46,635	60,344	44,954	51,168	52,067	66,870
%	0.63	0.68	0.59	0.75	0.53	0.57	0.57	0.71
Precision Production, Craft, and Repair	483,811	504,905	518,319	533,655	552,220	584,491	576,312	605,981
%	6.55	6.54	6.55	6.63	6.51	6.47	6.29	6.42
Operators, Fabricators, and Laborers	547,108	568,153	585,082	555,474	612,738	659,364	660,797	718,892
%	7.41	7.36	7.39	6.9	7.23	7.3	7.21	7.61
Military	35,059	37,852	33,903	33,870	37,541	43,307	42,466	60,808
%	0.47	0.49	0.43	0.42	0.44	0.48	0.46	0.64
Total	7,388,355	7,722,064	7,913,295	8,050,638	8,476,781	9,038,327	9,167,476	9,442,936
%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Number and percentage are compiled by the author. Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A7 Industry (General) in 1980, 1990 and 2000

	1980	1990	2000
Agriculture, Forestry, Fisheries and Mining	22,420	43,347	48,358
%	1.17	1.05	0.72
Construction	53,200	145,906	195,104
%	2.78	3.53	2.89
Manufacturing	417,280	717,229	1,036,878
%	21.78	17.34	15.34
Wholesale trade	77,940	178,678	235,289
%	4.07	4.32	3.48
Retalesale trade	176,880	483,236	791,851
%	9.23	11.68	11.72
Transportation, Communications, and other Public Utilities	121,200	285,444	512,510
%	6.33	6.9	7.58
Finance, Insurance, and Real estate	166,900	378,301	550,091
%	8.71	9.15	8.14
Business and Repair Services	61,480	192,703	506,875
%	3.21	4.66	7.5
Personal Services	42,640	132,303	208,769
%	2.23	3.2	3.09
Entertainment and Recreation Services	17,100	42,935	72,386
%	0.89	1.04	1.07
Professional and Related Services	651,840	1,287,557	2,246,762
%	34.03	31.13	33.24
Public Administration	106,880	197,623	304,554
%	5.58	4.78	4.51
Active Duty Military	0	51,346	48,776
%	0	1.24	0.72
Total	1,915,760	4,136,608	6,758,203
%	100.00	100.00	100.00

Source: Number and percentage are compiled by the author.
Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A8 Industry (General) 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
Agriculture, Forestry, Fisheries and Mining	64,689	69,861	74,625	83,566	68,095	81,170	77,095	100,629
%	0.88	0.9	0.94	1.04	0.8	0.9	0.84	1.07
Construction	237,050	252,442	295,048	283,873	317,965	352,931	365,882	388,228
%	3.21	3.27	3.73	3.53	3.75	3.9	3.99	4.11
Manufacturing	1,131,990	1,143,423	1,094,025	1,126,351	1,135,113	1,156,010	1,156,400	1,172,978
%	15.32	14.81	13.83	13.99	13.39	12.79	12.61	12.42
Wholesale trade	248,546	265,032	283,338	293,170	283,854	312,326	273,713	283,047
%	3.36	3.43	3.58	3.64	3.35	3.46	2.99	3
Retalesale trade	879,557	908,514	912,206	1,011,590	1,036,114	1,084,462	1,080,510	1,205,099
%	11.9	11.77	11.53	12.57	12.22	12	11.79	12.76
Transportation, Communications, and other Public Utilities	603,271	563,718	607,175	593,621	593,369	649,987	659,663	729,710
%	8.17	7.3	7.67	7.37	7	7.19	7.2	7.73
Finance, Insurance, and Real estate	600,806	653,139	649,602	673,092	747,027	796,400	815,539	797,962
%	8.13	8.46	8.21	8.36	8.81	8.81	8.9	8.45
Business and Repair Services	578,410	563,871	582,520	581,000	626,877	702,847	711,751	760,410
%	7.83	7.3	7.36	7.22	7.4	7.78	7.76	8.05
Personal Services	226,344	240,187	246,914	246,360	277,777	288,781	305,619	326,456
%	3.06	3.11	3.12	3.06	3.28	3.2	3.33	3.46
Entertainment and Recreation Services	78,738	79,477	89,610	89,476	95,291	99,727	102,410	113,212
%	1.07	1.03	1.13	1.11	1.12	1.1	1.12	1.2
Professional and Related Services	2,362,994	2,603,088	2,671,882	2,665,200	2,887,564	3,066,605	3,165,178	3,091,569
%	31.98	33.71	33.76	33.11	34.06	33.93	34.53	32.74
Public	340,901	341,460	372,447	369,469	370,194	403,774	411,250	412,828

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Administration								
%	4.61	4.42	4.71	4.59	4.37	4.47	4.49	4.37
Active Duty Military	35,059	37,852	33,903	33,870	37,541	43,307	42,466	60,808
%	0.47	0.49	0.43	0.42	0.44	0.48	0.46	0.64
Total	7,388,355	7,722,064	7,913,295	8,050,638	8,476,781	9,038,327	9,167,476	9,442,936
%	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Number and percentage are compiled by the author. Data are from the IPUMS site: http://usa.ipums.org/usa/

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Table A9 Occupation (Detailed) in 1980, 1990 and 2000

Occupation	1980	1980		1990	1990		2000	2000	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Managers and administrators	Physicians	24.77	Managers and administrators	Physicians	20.63	Managers and administrators	Physical scientists	40.01
2	Registered nurses	Civil engineers	11.93	Registered nurses	Subject instructors (HS/college)	15.85	Computer software developers	Physicians	27.12
3	Salespersons	Not-elsewhere-classified engineers	11.58	Salespersons	Civil engineers	15.45	Registered nurses	Computer software developers	25.57
4	Secretaries	Subject instructors (HS/college)	10.28	Accountants and auditors	Electrical engineer	13.65	Computer systems analysts and computer scientists	Electrical engineer	20.98
5	Primary school teachers	Technicians	10.06	Supervisors and proprietors of sales jobs	Not-elsewhere-classified engineers	13.41	Accountants and auditors	Not-elsewhere-classified engineers	19.21
6	Accountants and auditors	Electrical engineer	9.52	Secretaries	Technicians	13.04	Subject instructors (HS/college)	Subject instructors (HS/college)	17.57
7	Physicians	Accountants and auditors	7.6	Primary school teachers	Computer software developers	12.29	Supervisors and proprietors of sales jobs	Computer systems analysts and computer scientists	14.12
8	Subject instructors (HS/college)	Registered nurses	7.54	Subject instructors	Computer systems analysts and computer scientists	12.03	Primary school teachers	Accountants and auditors	13.24

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				(HS/college)					
9	Bookkeepers and accounting and auditing clerks	Managers and administrators	4.01	Bookkeepers and accounting and auditing clerks	Clinical laboratory technologies and technicians	11.68	Secretaries	Registered nurses	11.96
10	Production supervisors or foremen	Managers and specialists in marketing, advertising, and public relations	3.48	Computer software developers	Accountants and auditors	10.04	Physicians	Designers	11.07

Note: % here is the ratio of skilled foreign workers to the sum of native workers and foreign workers, i.e., $\% = \frac{\text{skilled foreign workers}}{\text{all native workers and foreign workers}} \times 100\%$.

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Table A10 Occupation (detailed) 2001-2008

Occupation	2001	2001		2002	2002		2003	2003	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Managers and administrators	Physical scientists	37.03	Managers and administrators	Physical scientists	36.88	Managers and administrators	Physical scientists	37.7
2	Computer software developers	Computer software developers	27.79	Computer software developers	Computer software developers	27.79	Computer software developers	Computer software developers	28.49
3	Registered nurses	Physicians	26.22	Registered nurses	Physicians	27.65	Registered nurses	Physicians	28.1
4	Computer systems analysts and computer scientists	Electrical engineer	22.31	Computer systems analysts and computer scientists	Electrical engineer	25.06	Computer systems analysts and computer scientists	Electrical engineer	24.4
5	Accountants and auditors	Not-elsewhere-classified engineers	20.44	Accountants and auditors	Subject instructors (HS/college)	21.25	Accountants and auditors	Subject instructors (HS/college)	21.29
6	Supervisors and proprietors of sales jobs	Subject instructors (HS/college)	19.11	Supervisors and proprietors of sales jobs	Not-elsewhere-classified engineers	19.22	Subject instructors (HS/college)	Not-elsewhere-classified engineers	21.03
7	Subject instructors (HS/college)	Computer systems analysts and computer scientists	14.67	Subject instructors (HS/college)	Computer systems analysts and computer scientists	15.74	Supervisors and proprietors of	Computer systems analysts and computer scientists	16.12

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							sales jobs		
8	Secretaries	Accountants and auditors	14.31	Primary school teachers	Accountants and auditors	14.68	Primary school teachers	Accountants and auditors	14.25
9	Primary school teachers	Engineering technicians	12.18	Secretaries	Registered nurses	13.59	Nursing aides, orderlies, and attendants	Designers	14
10	Nursing aides, orderlies, and attendants	Registered nurses	11.81	Retail sales clerks	Designers	13.09	Secretaries	Registered nurses	12.96

Table A10A10 Occupation (detailed) 2001-2008 (continue)

Occupation	2004	2004		2005	2005		2006	2006	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Managers and administrators	Physical scientists	42.61	Managers and administrators	Physical scientists	38.91	Managers and administrators	Medical scientists	49.14
2	Computer software developers	Computer software developers	31.19	Computer software developers	Computer software developers	30.66	Computer software developers	Physical scientists	39.64
3	Registered nurses	Physicians	30.06	Registered nurses	Physicians	28.51	Registered nurses	Computer software developers	32.75
4	Accountants and	Electrical engineer	25.7	Computer systems	Electrical engineer	26.71	Accountants	Physicians	30.5

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	auditors			analysts and computer scientists			and auditors		
5	Computer systems analysts and computer scientists	Subject instructors (HS/college)	19.83	Accountants and auditors	Subject instructors (HS/college)	22.3	Computer systems analysts and computer scientists	Electrical engineer	24.74
6	Supervisors and proprietors of sales jobs	Not-elsewhere-classified engineers	18.87	Subject instructors (HS/college)	Not-elsewhere-classified engineers	21.4	Subject instructors (HS/college)	Subject instructors (HS/college)	23.29
7	Subject instructors (HS/college)	Computer systems analysts and computer scientists	15.75	Supervisors and proprietors of sales jobs	Computer systems analysts and computer scientists	17.2	Supervisors and proprietors of sales jobs	Not-elsewhere-classified engineers	22.4
8	Primary school teachers	Accountants and auditors	15.28	Nursing aides, orderlies, and attendants	Accountants and auditors	15.57	Nursing aides, orderlies, and attendants	Computer systems analysts and computer scientists	16.96
9	Nursing aides, orderlies, and attendants	Designers	13.67	Primary school teachers	Management analysts	15.36	Primary school teachers	Accountants and auditors	16.25
10	Secretaries	Registered nurses	13.14	Secretaries	Registered nurses	14.03	Secretaries	Registered nurses	13.92

Table A10A10 Occupation (detailed) 2001-2008 (continue)

Occupation	**2007**	**2007**	**2008**	**2008**

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Rank	By Number	By Percentage	%	By Number	By Percentage	%
1	Managers and administrators	Computer software developers	31.74	Managers and administrators	Computer software developers	31.48
2	Computer software developers	Physicians	28.58	Computer software developers	Electrical engineer	24.27
3	Registered nurses	Electrical engineer	26.69	Registered nurses	Physicians	24.16
4	Computer systems analysts and computer scientists	Subject instructors (HS/college)	24.06	Accountants and auditors	Not-elsewhere-classified engineers	20.05
5	Accountants and auditors	Not-elsewhere-classified engineers	21.01	Computer systems analysts and computer scientists	Clinical laboratory technologies and technicians	17.34
6	Subject instructors (HS/college)	Civil engineers	20.13	Supervisors and proprietors of sales jobs	Accountants and auditors	16.88
7	Supervisors and proprietors of sales jobs	Clinical laboratory technologies and technicians	18.24	Nursing aides, orderlies, and attendants	Computer systems analysts and computer scientists	16.74
8	Nursing aides, orderlies, and attendants	Computer systems analysts and computer scientists	17.41	Primary school teachers	Management analysts	15.30
9	Primary school teachers	Accountants and auditors	16.11	Secretaries	Registered nurses	14.81
10	Secretaries	Management analysts	16.1	Retail sales clerks	Designers	14.19

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Table A11 Industry (detailed) in 1980, 1990 and 2000

Industry	1980	1980		1990	1990		2000	2000	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Hospitals	Engineering, architectural, and surveying services	10.7	Hospitals	Engineering, architectural, and surveying services	11.81	Hospitals	Computers and related equipment	19.19
2	Colleges and universities	Colleges and universities	7.76	Colleges and universities	Computers and related equipment	11.67	Elementary and secondary schools	Computer and data processing services	18.57
3	Elementary and secondary schools	Computers and related equipment	6.95	Elementary and secondary schools	Colleges and universities	11.3	Colleges and universities	Research, development, and testing services	17.59
4	Banking	Air transportation	6.01	Eating and drinking places	Research, development, and testing services	11.09	Computer and data processing services	Colleges and universities	14.08
5	All construction	Hospitals	5.89	All construction	Electrical machinery, equipment, and supplies	10.52	Eating and drinking places	Electrical machinery, equipment, and supplies	13.69
6	Eating and drinking places	Banking	5.16	Banking	Services incidental to transportation	9.48	All construction	Management and public relations services	12.84
7	Insurance	Hotels and motels	4.26	Insurance	Computer and data processing services	9.45	Electrical machinery, equipment, and supplies	Engineering, architectural, and surveying services	12.65
8	Engineering, architectural, and	National security and international affairs	3.93	Real estate, including real estate-insurance	Banking	8.1	Banking	Radio, TV, and computer stores	11.79

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	surveying services			offices					
9	Electrical machinery, equipment, and supplies	Electrical machinery, equipment, and supplies	3.77	Hotels and motels	Security, commodity brokerage, and investment companies	8.08	Health services	Security, commodity brokerage, and investment companies	11.62
10	Real estate, including real estate-insurance offices	Insurance	3.47	Electrical machinery, equipment, and supplies	Hospitals	7.86	Insurance	Hospitals	10.93

Note: % here is the ratio of skilled foreign workers to the sum of native workers and foreign workers.

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Table A12 Industry (detailed) 2001-2008

Industry	2001	2001		2002	2002		2003	2003	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Hospitals	Computer and data processing services	19.88	Hospitals	Computer and data processing services	21.96	Hospitals	Computer and data processing services	22.31
2	Colleges and universities	Machinery	19.69	Elementary and secondary schools	Machinery	21.24	Colleges and universities	Machinery	21.11
3	Elementary and secondary schools	Drugs	17.32	Colleges and universities	Research, development, and testing services	21.21	Elementary and secondary schools	Research, development, and testing services	19.3
4	Computer and data processing services	Research, development, and testing services	17.28	Computer and data processing services	Drugs	17.26	All construction	Drugs	18.83
5	Eating and drinking places	Electrical machinery, equipment, and supplies	16	Eating and drinking places	Electrical machinery, equipment, and supplies	15.58	Eating and drinking places	Electrical machinery, equipment, and supplies	15.96
6	All construction	Colleges and universities	14.23	All construction	Colleges and universities	14.59	Computer and data processing services	Colleges and universities	15.09
7	Electrical machinery, equipment, and supplies	Management and public relations services	13.31	Banking	Security, commodity brokerage, and investment companies	13.71	Health services	Engineering, architectural, and surveying services	14.44
8	Banking	Radio, TV, and computer stores	13.18	Health services	Medical, dental, and optical instruments and supplies	13.64	Banking	Security, commodity brokerage, and investment companies	12.89

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9	Health services	Security, commodity brokerage, and investment companies	12.74	Electrical machinery, equipment, and supplies	Management and public relations services	13.37	Electrical machinery, equipment, and supplies	Management and public relations services	12.76
10	Telephone communications	Engineering, architectural, and surveying services	12.14	Insurance	Engineering, architectural, and surveying services	12.89	Engineering, architectural, and surveying services	Air transportation	12.43

Table A12A12 Industry (detailed) 2001-2008 (continue)

Industry	2004	2004		2005	2005		2006	2006	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Hospitals	Computer and data processing services	22.62	Hospitals	Machinery	23.19	Hospitals	Computer and data processing services	23.87
2	Elementary and secondary schools	Machinery	21.61	Elementary and secondary schools	Computer and data processing services	22.74	Elementary and secondary schools	Research, development, and testing services	21.82
3	Colleges and universities	Research, development, and testing services	19.54	Colleges and universities	Research, development, and testing services	19.59	Colleges and universities	Machinery	21.05
4	Eating and drinking places	Drugs	17.52	All construction	Electrical machinery, equipment, and supplies	17.89	All construction	Drugs	17.72
5	All construction	Electrical machinery, equipment, and supplies	17.43	Eating and drinking places	Drugs	16.15	Computer and data processing services	Electrical machinery, equipment, and supplies	17.45
6	Computer and data processing services	Colleges and universities	14.44	Computer and data processing services	Colleges and universities	15.84	Eating and drinking places	Colleges and universities	16.37

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7	Health services	Radio, TV, and computer stores	13.58	Health services	Security, commodity brokerage, and investment companies	14.05	Health services	Management and public relations services	14.26
8	Electrical machinery, equipment, and supplies	Security, commodity brokerage, and investment companies	13.04	Banking	Management and public relations services	13.55	Banking	Security, commodity brokerage, and investment companies	13.89
9	Banking	Engineering, architectural, and surveying services	12.9	Electrical machinery, equipment, and supplies	Miscellaneous personal services	13.16	Electrical machinery, equipment, and supplies	Engineering, architectural, and surveying services	13.53
10	Insurance	Hotels and motels	12.57	Insurance	Engineering, architectural, and surveying services	12.86	Engineering, architectural, and surveying services	Air transportation	13.16

Table A12A12 Industry (detailed) 2001-2008 (continue)

Industry	2007	2007		2008	2008	
Rank	**By Number**	**By Percentage**	**%**	**By Number**	**By Percentage**	**%**
1	Hospitals	Computer and data processing services	23.51	Hospitals	Computer and data processing services	23.59
2	Colleges and universities	Machinery	21.78	Elementary and secondary schools	Computers and related equipment	21.26
3	Elementary and secondary schools	Research, development, and testing services	21.09	All construction	Electrical machinery, equipment, and supplies, n.e.c.	16.51

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4	All construction	Drugs	18.63	Eating and drinking places	Drugs	15.20
5	Computer and data processing services	Electrical machinery, equipment, and supplies	16.92	Computer and data processing services	Management and public relations services	14.65
6	Eating and drinking places	Colleges and universities	16.69	Health services, n.e.c.	Security, commodity brokerage, and investment companies	13.87
7	Health services	Management and public relations services	14.74	Colleges and universities	Air transportation	13.71
8	Banking	Security, commodity brokerage, and investment companies	14.49	Banking	Hotels and motels	13.32
9	Insurance	Engineering, architectural, and surveying services	12.99	Insurance	Miscellaneous personal services	13.31
10	Electrical machinery, equipment, and supplies	Hospitals	12.97	Electrical machinery, equipment, and supplies, n.e.c.	Accounting, auditing, and bookkeeping services	13.27

Note: % here is the ratio of high-skilled foreign workers to the sum of native workers and foreign workers.

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Table A13 Computers and Related Equipment

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	47	0.71%	0.71%	28:19>	1.754*	1.018	0.977	1.724*
-29	47	0.65%	1.36%	26:21	1.317$	1.166	0.898	1.139
-28	47	-0.20%	1.16%	29:18>	-0.188	-0.135	-0.269	2.016*
-27	47	0.55%	1.71%	21:26	0.518	0.381	0.754	-0.322
-26	47	1.39%	3.10%	30:17>	2.167*	2.097*	1.912*	2.308*
-25	47	1.17%	4.27%	32:15>>	2.275*	1.994*	1.609$	2.893**
-24	47	-1.52%	2.75%	12:35<<	-2.882**	-2.414**	-2.088*	-2.952**
-23	47	-0.37%	2.38%	19:28	-0.251	-0.208	-0.513	-0.906
-22	47	-0.34%	2.04%	20:27	-0.908	-0.599	-0.469	-0.614
-21	47	-0.57%	1.47%	18:29	-1.481$	-1.420$	-0.781	-1.199
-20	47	0.71%	2.18%	32:15>>	0.987	0.774	0.969	2.893**
-19	47	1.81%	3.99%	33:14>>>	3.701***	2.740**	2.478**	3.185***
-18	47	1.30%	5.29%	30:17>	3.468***	1.890*	1.781*	2.308*
-17	47	-0.12%	5.17%	23:24	0.48	0.377	-0.161	0.263
-16	47	-0.83%	4.34%	21:26	-1.085	-0.877	-1.133	-0.322
-15	47	1.45%	5.79%	28:19>	2.976**	2.700**	1.987*	1.724*
-14	47	0.12%	5.91%	25:22	0.116	0.115	0.168	0.847
-13	47	-0.86%	5.05%	17:30(	-2.563**	-2.434**	-1.178	-1.491$
-12	47	-0.51%	4.54%	25:22	-0.681	-0.321	-0.697	0.847
-11	47	1.14%	5.68%	29:18>	2.250*	1.772*	1.568$	2.016*
-10	47	-0.90%	4.78%	19:28	-1.683*	-1.244	-1.233	-0.906
-9	47	0.49%	5.27%	24:23	0.611	0.479	0.668	0.555
-8	47	-1.73%	3.54%	12:35<<	-3.291***	-2.782**	-2.380**	-2.952**
-7	47	-0.67%	2.87%	25:22	-1.232	-0.675	-0.917	0.847
-6	47	-1.73%	1.14%	20:27	-1.677*	-1.113	-2.379**	-0.614
-5	47	-2.69%	-1.55%	18:29	-4.462***	-2.416**	-3.687***	-1.199
-4	47	-0.65%	-2.20%	20:27	-1.222	-0.716	-0.894	-0.614
-3	47	1.97%	-0.23%	28:19>	3.067**	1.988*	2.703**	1.724*
-2	47	-0.08%	-0.31%	27:20)	-0.199	-0.156	-0.115	1.432$
-1	47	0.59%	0.28%	20:27	1.466$	0.954	0.816	-0.614
0	47	-3.11%	-2.83%	8:39<<<	-5.624***	-5.276***	-4.272***	-4.121***
1	47	-1.47%	-4.30%	16:31<	-2.641**	-2.046*	-2.024*	-1.783*

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2	47	3.81%	-0.49%	28:19>	6.334***	3.656***	5.226***	1.724*
3	47	1.65%	1.16%	22:25	2.674**	1.441$	2.265*	-0.03
4	47	1.67%	2.83%	25:22	3.589***	1.737*	2.298*	0.847
5	47	1.62%	4.45%	20:27	2.026*	1.416$	2.218*	-0.614
6	47	1.77%	6.22%	32:15>>	3.482***	2.269*	2.436**	2.893**
7	47	0.86%	7.08%	22:25	1.628$	1.246	1.182	-0.03
8	47	-0.05%	7.03%	27:20)	-0.771	-0.514	-0.073	1.432$
9	47	0.18%	7.21%	27:20)	0.219	0.215	0.246	1.432$
10	47	0.67%	7.88%	24:23	2.326**	1.360$	0.919	0.555
11	47	0.51%	8.39%	29:18>	1.311$	0.871	0.699	2.016*
12	47	-0.44%	7.95%	25:22	-0.929	-0.628	-0.606	0.847
13	47	1.72%	9.67%	28:19>	2.369**	1.718*	2.365**	1.724*
14	47	2.78%	12.45%	22:25	3.890***	1.851*	3.809***	-0.03
15	47	0.85%	13.30%	22:25	2.507**	1.465$	1.168	-0.03
16	47	0.42%	13.72%	21:26	0.851	0.621	0.572	-0.322
17	47	1.40%	15.12%	29:18>	2.178*	1.942*	1.923*	2.016*
18	47	-0.84%	14.28%	19:28	-1.692*	-1.740*	-1.155	-0.906
19	47	0.44%	14.72%	23:24	0.506	0.333	0.607	0.263
20	47	0.99%	15.71%	32:15>>	1.420$	0.653	1.352$	2.893**
21	47	-0.81%	14.90%	16:31<	-1.697*	-1.318$	-1.115	-1.783*
22	47	-0.36%	14.54%	21:26	-1.154	-1.106	-0.497	-0.322
23	47	-0.90%	13.64%	15:32<	-1.714*	-1.795*	-1.231	-2.075*
24	47	0.07%	13.71%	26:21	0.647	0.54	0.103	1.139
25	47	2.60%	16.31%	28:19>	4.741***	2.260*	3.572***	1.724*
26	47	0.35%	16.66%	21:26	0.925	0.688	0.48	-0.322
27	47	-0.18%	16.48%	19:28	-0.792	-0.54	-0.249	-0.906
28	47	-0.53%	15.95%	21:26	-0.435	-0.306	-0.733	-0.322
29	47	1.56%	17.51%	25:22	2.314*	1.897*	2.140*	0.847
30	47	1.21%	18.72%	23:24	2.210*	2.116*	1.659*	0.263

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A14 Computer and Data Processing Services

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	584	1.86%	1.86%	335:249>>>	11.020***	6.802***	2.444**	5.567***
-29	584	-0.43%	1.43%	265:319	-3.012**	-2.178*	-0.568	-0.246
-28	584	0.31%	1.74%	323:261>>>	1.786*	1.364$	0.408	4.571***
-27	584	-0.14%	1.60%	261:323	0.746	0.503	-0.188	-0.578
-26	584	0.18%	1.78%	289:295>	1.002	0.831	0.234	1.747*
-25	584	-0.56%	1.22%	275:309	-1.716*	-1.426$	-0.737	0.585
-24	584	-0.93%	0.29%	233:351<<	-4.470***	-3.376***	-1.23	-2.903**
-23	584	-0.08%	0.21%	256:328	-1.169	-0.831	-0.103	-0.993
-22	584	-0.82%	-0.61%	210:374<<<	-4.371***	-3.128***	-1.081	-4.813***
-21	584	1.12%	0.51%	287:297)	5.138***	3.722***	1.469$	1.581$
-20	584	0.87%	1.38%	332:252>>>	5.487***	4.081***	1.146	5.318***
-19	584	0.24%	1.62%	269:315	2.220*	1.629$	0.32	0.086
-18	584	-0.28%	1.34%	243:341<	-1.335$	-1.109	-0.371	-2.073*
-17	584	0.84%	2.18%	301:283>>	5.042***	3.556***	1.102	2.744**
-16	584	-0.08%	2.10%	248:336<	-1.091	-0.743	-0.107	-1.657*
-15	584	1.27%	3.37%	334:250>>>	6.538***	4.960***	1.669*	5.484***
-14	584	-0.21%	3.16%	255:329	-1.960*	-1.467$	-0.275	-1.076
-13	584	-0.07%	3.09%	256:328	-1.112	-0.675	-0.093	-0.993
-12	584	-0.59%	2.50%	267:317	-3.694***	-2.717**	-0.776	-0.08
-11	584	1.68%	4.18%	368:216>>>	9.271***	6.812***	2.211*	8.308***
-10	584	-1.54%	2.64%	219:365<<<	-8.935***	-5.608***	-2.026*	-4.066***
-9	584	-2.21%	0.43%	188:396<<<	-13.723***	-8.523***	-2.911**	-6.640***
-8	584	-3.11%	-2.68%	185:399<<<	-17.682***	-11.225***	-4.090***	-6.889***
-7	584	-1.43%	-4.11%	240:344<	-7.843***	-5.027***	-1.887*	-2.322*
-6	584	-2.92%	-7.03%	204:380<<<	-14.809***	-8.334***	-3.839***	-5.311***
-5	584	-3.12%	-10.15%	179:405<<<	-16.233***	-8.533***	-4.109***	-7.387***
-4	584	1.46%	-8.69%	293:291>	10.584***	5.184***	1.917*	2.079*
-3	584	2.02%	-6.67%	351:233>>>	11.569***	6.680***	2.652**	6.896***
-2	584	-0.56%	-7.23%	250:334(	-6.129***	-3.406***	-0.741	-1.491$
-1	584	-0.75%	-7.98%	240:344<	-3.396***	-2.079*	-0.984	-2.322*
0	584	-0.31%	-8.29%	253:331	-0.49	-0.297	-0.409	-1.242
1	584	0.62%	-7.67%	270:314	4.511***	2.439**	0.82	0.17

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2	584	2.39%	-5.28%	357:227>>>	13.705***	7.282***	3.148***	7.394***
3	584	0.91%	-4.37%	298:286>>	4.134***	2.129*	1.202	2.495**
4	584	0.96%	-3.41%	286:298)	4.091***	2.475**	1.258	1.498$
5	584	1.51%	-1.90%	284:300)	7.035***	3.872***	1.983*	1.332$
6	584	1.22%	-0.68%	341:243>>>	6.631***	4.222***	1.599$	6.066***
7	583	2.19%	1.51%	318:265>>>	9.349***	5.223***	2.874**	4.197***
8	583	1.75%	3.26%	362:221>>>	10.014***	6.803***	2.297*	7.854***
9	582	0.14%	3.40%	257:325	1.412$	0.884	0.188	-0.835
10	582	-0.02%	3.38%	248:334(	-0.333	-0.235	-0.028	-1.584$
11	582	1.07%	4.45%	267:315	4.487***	2.777**	1.413$	-0.003
12	581	1.18%	5.63%	301:280>>	6.262***	4.069***	1.549$	2.865**
13	581	0.51%	6.14%	276:305	1.759*	1.308$	0.669	0.784
14	581	0.66%	6.80%	295:286>>	3.704***	2.868**	0.874	2.366**
15	580	0.11%	6.91%	242:338<	-0.371	-0.239	0.145	-2.010*
16	579	1.45%	8.36%	307:272>>>	6.451***	4.334***	1.909*	3.447***
17	579	1.47%	9.83%	341:238>>>	7.666***	5.512***	1.928*	6.283***
18	578	0.39%	10.22%	256:322	0.376	0.277	0.518	-0.768
19	578	0.84%	11.06%	287:291>	2.668**	1.740*	1.104	1.819*
20	578	0.23%	11.29%	279:299	1.273	0.931	0.304	1.151
21	578	0.20%	11.49%	208:370<<<	-2.352**	-1.421$	0.262	-4.775***
22	578	0.03%	11.52%	257:321	0.85	0.483	0.044	-0.685
23	577	-0.63%	10.89%	234:343<<	-3.315***	-2.802**	-0.827	-2.569**
24	577	0.72%	11.61%	273:304	3.287***	2.448**	0.949	0.689
25	576	-0.08%	11.53%	247:329(	0.012	0.008	-0.105	-1.446$
26	576	-0.76%	10.77%	211:365<<<	-4.587***	-3.547***	-0.999	-4.456***
27	576	-0.42%	10.35%	222:354<<<	-1.818*	-1.423$	-0.551	-3.536***
28	576	-0.38%	9.97%	266:310	-1.255	-0.939	-0.503	0.143
29	575	1.84%	11.81%	292:283>>	7.521***	4.318***	2.419**	2.358**
30	575	2.78%	14.59%	308:267>>>	10.458***	5.345***	3.660***	3.697***

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A15 Research, Development, and Testing Services

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	80	1.46%	1.46%	48:32>	3.433***	1.910*	1.998*	2.200*
-29	81	-0.22%	1.24%	39:42	0.046	0.034	-0.299	0.078
-28	81	0.56%	1.80%	47:34>	1.293$	0.88	0.77	1.858*
-27	81	1.28%	3.08%	43:38	2.928**	1.761*	1.749*	0.968
-26	81	0.83%	3.91%	44:37	0.463	0.252	1.13	1.191
-25	81	0.62%	4.53%	47:34>	1.423$	0.915	0.843	1.858*
-24	81	0.50%	5.03%	40:41	1.658*	0.97	0.691	0.301
-23	81	0.36%	5.39%	35:46	1.531$	0.768	0.495	-0.811
-22	81	0.38%	5.77%	38:43	-0.26	-0.139	0.525	-0.144
-21	81	0.23%	6.00%	37:44	0.705	0.454	0.31	-0.367
-20	81	0.07%	6.07%	42:39	0.086	0.073	0.093	0.746
-19	81	0.18%	6.25%	42:39	-0.385	-0.149	0.245	0.746
-18	81	-0.84%	5.41%	35:46	-0.553	-0.34	-1.15	-0.811
-17	81	1.24%	6.65%	42:39	2.852**	1.475$	1.704*	0.746
-16	81	0.19%	6.84%	40:41	0.737	0.354	0.254	0.301
-15	81	1.74%	8.58%	46:35)	2.114*	1.510$	2.384**	1.636$
-14	81	-0.02%	8.56%	34:47	-0.341	-0.249	-0.025	-1.034
-13	81	-0.18%	8.38%	29:52<	-1.048	-0.752	-0.253	-2.146*
-12	81	-0.17%	8.21%	41:40	0.482	0.328	-0.232	0.523
-11	81	2.35%	10.56%	50:31>>	5.032***	3.374***	3.226***	2.525**
-10	81	-2.48%	8.08%	26:55<<	-5.480***	-3.865***	-3.397***	-2.814**
-9	81	-0.52%	7.56%	32:49(	-0.393	-0.239	-0.713	-1.479$
-8	81	-1.92%	5.64%	31:50<	-4.153***	-2.153*	-2.630**	-1.701*
-7	81	-0.10%	5.54%	41:40	-0.767	-0.369	-0.131	0.523
-6	81	-2.04%	3.50%	32:49(	-3.584***	-1.819*	-2.797**	-1.479$
-5	81	-2.39%	1.11%	31:50<	-4.691***	-2.116*	-3.277***	-1.701*
-4	81	3.09%	4.20%	47:34>	5.840***	2.441**	4.239***	1.858*
-3	81	1.12%	5.32%	44:37	2.694**	1.370$	1.537$	1.191
-2	81	-0.42%	4.90%	32:49(	-1.929*	-1.031	-0.58	-1.479$
-1	81	0.18%	5.08%	35:46	0.943	0.556	0.248	-0.811
0	81	0.11%	5.19%	25:56<<	-0.939	-0.452	0.15	-3.036**
1	81	0.01%	5.20%	35:46	0.283	0.174	0.017	-0.811

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2	81	-0.34%	4.86%	39:42	1.547$	0.753	-0.46	0.078
3	81	0.87%	5.73%	46:35)	1.768*	0.93	1.187	1.636$
4	81	-0.19%	5.54%	38:43	-0.026	-0.014	-0.257	-0.144
5	81	0.80%	6.34%	38:43	2.372**	1.407$	1.093	-0.144
6	81	3.29%	9.63%	60:21>>>	7.022***	3.982***	4.502***	4.750***
7	81	1.89%	11.52%	44:37	3.464***	2.221*	2.585**	1.191
8	81	0.10%	11.62%	47:34>	1.550$	0.835	0.137	1.858*
9	81	1.23%	12.85%	49:32>	2.866**	2.226*	1.690*	2.303*
10	81	0.22%	13.07%	34:47	-0.36	-0.143	0.3	-1.034
11	81	0.30%	13.37%	35:46	0.875	0.468	0.407	-0.811
12	81	1.44%	14.81%	42:39	2.420**	1.484$	1.967*	0.746
13	81	1.23%	16.04%	46:35)	2.684**	1.086	1.684*	1.636$
14	81	0.84%	16.88%	40:41	1.11	0.848	1.151	0.301
15	81	-0.71%	16.17%	32:49(	-1.450$	-1.016	-0.976	-1.479$
16	81	1.84%	18.01%	42:39	3.689***	2.454**	2.521**	0.746
17	81	1.97%	19.98%	51:30>>	3.504***	1.963*	2.692**	2.748**
18	81	0.22%	20.20%	42:39	0.985	0.599	0.305	0.746
19	81	-0.61%	19.59%	35:46	-1.608$	-1.211	-0.839	-0.811
20	81	0.82%	20.41%	42:39	0.252	0.191	1.123	0.746
21	81	-1.14%	19.27%	30:51<	-1.964*	-1.407$	-1.559$	-1.924*
22	81	-0.82%	18.45%	30:51<	-2.335**	-1.821*	-1.128	-1.924*
23	81	-0.93%	17.52%	27:54<<	-2.623**	-2.826**	-1.267	-2.591**
24	81	0.76%	18.28%	36:45	1.677*	1.186	1.041	-0.589
25	81	0.62%	18.90%	46:35)	0.961	0.738	0.847	1.636$
26	81	-0.66%	18.24%	32:49(	-0.423	-0.248	-0.9	-1.479$
27	81	0.45%	18.69%	36:45	-0.102	-0.05	0.614	-0.589
28	81	0.88%	19.57%	42:39	2.344**	1.264	1.208	0.746
29	81	1.23%	20.80%	37:44	2.565**	1.601$	1.691*	-0.367
30	81	0.09%	20.89%	30:51<	0.321	0.24	0.121	-1.924*

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A16 Electrical Machinery, Equipment, and Supplies

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	346	1.76%	1.76%	202:144>>>	6.771***	3.973***	2.451**	4.074***
-29	346	-0.35%	1.41%	150:196(	-2.575**	-1.698*	-0.492	-1.524$
-28	346	0.98%	2.39%	212:134>>>	5.392***	3.939***	1.372$	5.151***
-27	346	-0.60%	1.79%	143:203<	-2.648**	-1.700*	-0.836	-2.278*
-26	346	0.36%	2.15%	186:160>>	1.766*	1.334$	0.498	2.352**
-25	346	0.14%	2.29%	194:152>>>	1.203	0.933	0.202	3.213***
-24	346	-0.74%	1.55%	127:219<<<	-4.394***	-3.246***	-1.034	-4.000***
-23	346	-0.13%	1.42%	132:214<<<	-1.469$	-1.187	-0.183	-3.462***
-22	346	-1.27%	0.15%	116:230<<<	-5.169***	-3.872***	-1.773*	-5.185***
-21	346	0.50%	0.65%	165:181	0.891	0.673	0.699	0.091
-20	346	0.68%	1.33%	213:133>>>	3.534***	2.601**	0.947	5.259***
-19	346	0.91%	2.24%	167:179	4.319***	2.899**	1.269	0.306
-18	346	0.17%	2.41%	169:177	0.662	0.525	0.233	0.522
-17	346	0.59%	3.00%	150:196(	1.864*	1.156	0.83	-1.524$
-16	346	-0.43%	2.57%	127:219<<<	-2.840**	-1.920*	-0.595	-4.000***
-15	346	1.42%	3.99%	218:128>>>	6.359***	4.195***	1.983*	5.797***
-14	346	0.23%	4.22%	179:167)	0.896	0.623	0.32	1.598$
-13	346	-0.08%	4.14%	143:203<	-1.109	-0.818	-0.107	-2.278*
-12	346	-0.56%	3.58%	152:194(	-3.439***	-1.697*	-0.784	-1.309$
-11	346	1.67%	5.25%	229:117>>>	8.844***	6.079***	2.325*	6.981***
-10	346	0.26%	5.51%	183:163>	0.296	0.192	0.367	2.029*
-9	346	-1.16%	4.35%	117:229<<<	-5.481***	-3.822***	-1.623$	-5.077***
-8	346	-1.74%	2.61%	136:210<<	-8.472***	-5.769***	-2.434**	-3.031**
-7	346	0.18%	2.79%	191:155>>	1.471$	1.019	0.25	2.890**
-6	346	-0.64%	2.15%	173:173	-2.289*	-1.231	-0.896	0.952
-5	346	-2.86%	-0.71%	118:228<<<	-11.818***	-7.064***	-3.986***	-4.969***
-4	346	0.17%	-0.54%	162:184	-0.378	-0.187	0.234	-0.232
-3	346	1.10%	0.56%	194:152>>>	5.791***	3.209***	1.541$	3.213***
-2	346	-0.37%	0.19%	167:179	-1.551$	-0.958	-0.512	0.306
-1	346	-0.47%	-0.28%	150:196(	-2.150*	-1.436$	-0.652	-1.524$
0	346	-0.98%	-1.26%	122:224<<<	-4.125***	-2.182*	-1.366$	-4.539***
1	346	0.90%	-0.36%	169:177	4.052***	2.079*	1.251	0.522

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2	346	2.02%	1.66%	191:155>>	9.552***	3.948***	2.819**	2.890**
3	346	1.95%	3.61%	202:144>>>	10.321***	5.066***	2.721**	4.074***
4	346	1.32%	4.93%	191:155>>	6.359***	3.326***	1.844*	2.890**
5	346	1.50%	6.43%	185:161>	7.567***	3.324***	2.096*	2.244*
6	346	2.97%	9.40%	250:96>>>	13.223***	7.002***	4.151***	9.242***
7	346	1.66%	11.06%	191:155>>	8.200***	4.410***	2.320*	2.890**
8	346	1.81%	12.87%	215:131>>>	8.158***	4.486***	2.530**	5.474***
9	345	0.83%	13.70%	176:169)	4.077***	2.663**	1.156	1.328$
10	345	1.14%	14.84%	152:193	4.471***	2.577**	1.586$	-1.259
11	345	0.48%	15.32%	164:181	1.296$	0.885	0.671	0.034
12	345	1.22%	16.54%	178:167)	6.059***	3.426***	1.704*	1.544$
13	345	0.76%	17.30%	186:159>>	2.995**	1.855*	1.067	2.406**
14	344	1.89%	19.19%	198:146>>>	9.677***	3.744***	2.634**	3.757***
15	344	-0.07%	19.12%	134:210<<<	-1.788*	-1.326$	-0.091	-3.154***
16	344	-0.26%	18.86%	145:199<	-0.937	-0.586	-0.365	-1.966*
17	344	1.28%	20.14%	207:137>>>	5.321***	3.268***	1.792*	4.728***
18	344	0.24%	20.38%	186:158>>	1.413$	1.026	0.33	2.461**
19	344	1.51%	21.89%	209:135>>>	5.834***	3.844***	2.105*	4.944***
20	343	0.36%	22.25%	192:151>>>	2.247*	1.596$	0.505	3.165***
21	343	0.49%	22.74%	126:217<<<	1.779*	0.915	0.678	-3.972***
22	343	-0.29%	22.45%	153:190	-0.823	-0.644	-0.401	-1.052
23	341	0.16%	22.61%	147:194(	-0.107	-0.083	0.217	-1.603$
24	341	0.51%	23.12%	164:177	2.103*	1.474$	0.706	0.24
25	341	0.48%	23.60%	163:178	1.900*	1.410$	0.672	0.132
26	341	0.04%	23.64%	142:199<	-0.5	-0.401	0.051	-2.146*
27	341	-1.13%	22.51%	117:224<<<	-5.339***	-3.659***	-1.573$	-4.857***
28	341	-0.23%	22.28%	173:168	-0.385	-0.32	-0.32	1.216
29	341	0.85%	23.13%	161:180	3.281***	2.505**	1.182	-0.085
30	341	0.17%	23.30%	152:189	1.229	0.867	0.233	-1.061

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A17 Management and Public Relations Services

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	52	1.98%	1.98%	30:22>	3.894***	2.140*	2.794**	1.703*
-29	52	-1.10%	0.88%	18:34(	-2.179*	-1.793*	-1.551$	-1.636$
-28	52	0.00%	0.88%	27:25:00	0.444	0.3	0.002	0.868
-27	52	-1.05%	-0.17%	19:33(	-1.826*	-1.079	-1.487$	-1.358$
-26	52	1.08%	0.91%	32:20>	2.906**	2.209*	1.534$	2.260*
-25	52	-0.07%	0.84%	29:23)	0.391	0.309	-0.092	1.425$
-24	52	-1.07%	-0.23%	15:37<<	-2.268*	-2.180*	-1.508$	-2.471**
-23	52	0.17%	-0.06%	24:28:00	-0.07	-0.05	0.24	0.034
-22	52	0.64%	0.58%	21:31	1.852*	0.851	0.907	-0.801
-21	52	1.25%	1.83%	28:24:00	2.574**	1.978*	1.768*	1.147
-20	52	0.13%	1.96%	31:21>	0.394	0.346	0.186	1.981*
-19	52	1.00%	2.96%	27:25:00	2.368**	1.630$	1.410$	0.868
-18	52	-0.68%	2.28%	16:36<	-2.595**	-2.174*	-0.966	-2.193*
-17	52	0.09%	2.37%	26:26:00	0.269	0.173	0.132	0.59
-16	52	0.40%	2.77%	23:29	0.467	0.289	0.563	-0.245
-15	52	-0.78%	1.99%	24:28:00	-1.502$	-1.023	-1.106	0.034
-14	52	1.13%	3.12%	28:24:00	1.517$	1.234	1.603$	1.147
-13	52	-0.93%	2.19%	22:30	-1.949*	-1.541$	-1.317$	-0.523
-12	52	-1.15%	1.04%	23:29	-3.621***	-1.557$	-1.627$	-0.245
-11	52	0.95%	1.99%	35:17>>>	2.854**	1.511$	1.339$	3.095***
-10	52	-0.56%	1.43%	23:29	-2.254*	-1.214	-0.798	-0.245
-9	52	-2.57%	-1.14%	14:38<<	-4.625***	-3.596***	-3.637***	-2.749**
-8	52	-1.99%	-3.13%	19:33(	-3.986***	-2.153*	-2.813**	-1.358$
-7	52	-0.86%	-3.99%	26:26:00	-0.926	-0.38	-1.21	0.59
-6	52	-1.67%	-5.66%	20:32	-3.243***	-2.327**	-2.359**	-1.08
-5	52	-2.98%	-8.64%	14:38<<	-6.394***	-2.390**	-4.218***	-2.749**
-4	52	0.79%	-7.85%	24:28:00	0.662	0.356	1.112	0.034
-3	52	0.39%	-7.46%	26:26:00	0.939	0.498	0.556	0.59
-2	52	-0.09%	-7.55%	25:27:00	-0.287	-0.199	-0.131	0.312
-1	52	-1.49%	-9.04%	20:32	-2.529**	-1.921*	-2.108*	-1.08
0	52	-0.27%	-9.31%	19:33(	-1.372$	-0.66	-0.379	-1.358$
1	52	1.21%	-8.10%	30:22>	4.105***	1.420$	1.714*	1.703*

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2	52	3.62%	-4.48%	29:23)	6.034***	2.900**	5.122***	1.425$
3	52	0.17%	-4.31%	25:27:00	0.489	0.282	0.243	0.312
4	52	0.29%	-4.02%	23:29	-0.052	-0.029	0.404	-0.245
5	52	-0.69%	-4.71%	21:31	-1.027	-0.393	-0.98	-0.801
6	52	2.08%	-2.63%	30:22>	3.960***	2.161*	2.938**	1.703*
7	52	0.11%	-2.52%	22:30	-0.719	-0.37	0.151	-0.523
8	52	0.02%	-2.50%	34:18>>	1.892*	1.076	0.028	2.816**
9	52	2.02%	-0.48%	25:27:00	3.234***	1.578$	2.862**	0.312
10	52	0.74%	0.26%	25:27:00	1.164	0.814	1.053	0.312
11	52	0.79%	1.05%	27:25:00	1.481$	1.026	1.117	0.868
12	52	1.68%	2.73%	31:21>	4.034***	2.477**	2.371**	1.981*
13	52	0.97%	3.70%	29:23)	1.949*	1.137	1.374$	1.425$
14	52	-0.16%	3.54%	23:29	-0.139	-0.098	-0.222	-0.245
15	52	-0.32%	3.22%	24:28:00	-0.603	-0.472	-0.448	0.034
16	52	-0.29%	2.93%	26:26:00	-0.808	-0.427	-0.408	0.59
17	52	1.67%	4.60%	35:17>>>	3.796***	2.234*	2.357**	3.095***
18	52	-0.84%	3.76%	21:31	-0.972	-0.883	-1.182	-0.801
19	52	-1.44%	2.32%	23:29	-3.051**	-2.606**	-2.042*	-0.245
20	52	-0.79%	1.53%	20:32	-1.1	-0.942	-1.118	-1.08
21	52	-0.53%	1.00%	22:30	-1.506$	-1.107	-0.754	-0.523
22	52	0.36%	1.36%	25:27:00	0.452	0.31	0.506	0.312
23	52	0.84%	2.20%	24:28:00	0.482	0.308	1.184	0.034
24	52	0.29%	2.49%	27:25:00	0.644	0.362	0.413	0.868
25	52	0.42%	2.91%	24:28:00	-0.227	-0.124	0.59	0.034
26	52	-0.04%	2.87%	23:29	0.567	0.487	-0.056	-0.245
27	52	-0.94%	1.93%	21:31	-1.666*	-1.022	-1.335$	-0.801
28	52	1.65%	3.58%	30:22>	2.663**	1.519$	2.327**	1.703*
29	52	-0.07%	3.51%	22:30	0.229	0.211	-0.097	-0.523
30	52	0.38%	3.89%	23:29	0.496	0.436	0.532	-0.245

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A18 Engineering, Architectural, and Surveying Services

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	24	4.79%	4.79%	13:11	3.003**	1.709*	3.778***	0.96
-29	24	-1.88%	2.91%	9:15	-1.759*	-1.675*	-1.480$	-0.683
-28	24	0.69%	3.60%	13:11	1.375$	1.117	0.545	0.96
-27	24	-0.48%	3.12%	13:11	0.249	0.251	-0.377	0.96
-26	24	0.00%	3.12%	9:15	-0.38	-0.499	-0.001	-0.683
-25	24	-1.07%	2.05%	11:13	-0.37	-0.266	-0.845	0.139
-24	24	0.21%	2.26%	10:14	-0.676	-0.741	0.167	-0.272
-23	24	1.41%	3.67%	10:14	-0.636	-0.375	1.114	-0.272
-22	24	0.19%	3.86%	6:18<	0.369	0.372	0.153	-1.915*
-21	24	1.81%	5.67%	6:18<	0.542	0.256	1.430$	-1.915*
-20	24	0.15%	5.82%	13:11	0.769	0.679	0.116	0.96
-19	24	0.07%	5.89%	13:11	0.315	0.195	0.057	0.96
-18	24	-1.17%	4.72%	8:16	-0.814	-0.544	-0.927	-1.094
-17	24	2.83%	7.55%	12:12	1.228	0.739	2.235*	0.549
-16	24	-3.41%	4.14%	4:20<<	-2.699**	-2.269*	-2.693**	-2.737**
-15	24	5.18%	9.32%	21:3>>>	5.223***	3.397***	4.093***	4.247***
-14	24	-1.29%	8.03%	10:14	-0.558	-0.629	-1.016	-0.272
-13	24	-0.62%	7.41%	9:15	-0.334	-0.277	-0.489	-0.683
-12	24	-0.43%	6.98%	10:14	0.718	0.664	-0.341	-0.272
-11	24	2.22%	9.20%	14:10)	2.186*	1.340$	1.755*	1.371$
-10	24	-3.18%	6.02%	7:17(	-2.444**	-1.299$	-2.513**	-1.505$
-9	24	-0.11%	5.91%	6:18<	-1.136	-0.717	-0.09	-1.915*
-8	24	-3.04%	2.87%	8:16	-3.963***	-3.418***	-2.403**	-1.094
-7	24	0.61%	3.48%	10:14	-0.233	-0.226	0.484	-0.272
-6	24	-1.42%	2.06%	12:12	-1.221	-0.98	-1.124	0.549
-5	24	-1.61%	0.45%	8:16	-3.236***	-2.306*	-1.271	-1.094
-4	24	-3.53%	-3.08%	9:15	-1.434$	-0.91	-2.789**	-0.683
-3	24	3.53%	0.45%	11:13	0.725	0.374	2.783**	0.139
-2	24	-0.79%	-0.34%	11:13	-1.228	-1.233	-0.621	0.139
-1	24	-2.01%	-2.35%	6:18<	-1.904*	-1.930*	-1.589$	-1.915*
0	24	-0.43%	-2.78%	10:14	-1.300$	-0.924	-0.342	-0.272
1	24	1.58%	-1.20%	12:12	2.379**	1.286$	1.243	0.549

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2	24	2.43%	1.23%	17:7>>	3.012**	1.989*	1.915*	2.603**
3	24	0.00%	1.23%	9:15	-0.079	-0.045	-0.001	-0.683
4	24	-0.73%	0.50%	12:12	-0.394	-0.161	-0.573	0.549
5	24	-3.27%	-2.77%	11:13	-0.255	-0.094	-2.578**	0.139
6	24	11.78%	9.01%	16:8>	8.298***	1.473$	9.298***	2.193*
7	24	2.89%	11.90%	10:14	1.496$	0.466	2.279*	-0.272
8	24	0.78%	12.68%	14:10)	2.053*	1.655*	0.612	1.371$
9	24	-1.75%	10.93%	9:15	-1.628$	-1.460$	-1.378$	-0.683
10	24	-1.74%	9.19%	6:18<	-2.396**	-2.257*	-1.371$	-1.915*
11	24	0.39%	9.58%	12:12	-0.417	-0.211	0.305	0.549
12	24	3.46%	13.04%	10:14	3.018**	0.973	2.728**	-0.272
13	24	-1.99%	11.05%	9:15	-0.838	-0.764	-1.569$	-0.683
14	24	1.05%	12.10%	13:11	1.603$	1.495$	0.83	0.96
15	24	1.70%	13.80%	10:14	1.905*	1.157	1.340$	-0.272
16	24	1.71%	15.51%	9:15	1.290$	0.711	1.352$	-0.683
17	24	-0.09%	15.42%	14:10)	0.45	0.402	-0.075	1.371$
18	24	1.81%	17.23%	14:10)	2.219*	1.322$	1.429$	1.371$
19	24	0.57%	17.80%	14:10)	1.678*	1.524$	0.446	1.371$
20	24	1.00%	18.80%	15:9>	-0.252	-0.246	0.789	1.782*
21	24	0.23%	19.03%	7:17(	-1.04	-0.881	0.178	-1.505$
22	24	-0.22%	18.81%	12:12	-0.312	-0.34	-0.174	0.549
23	24	0.22%	19.03%	9:15	0.034	0.032	0.171	-0.683
24	24	0.32%	19.35%	9:15	-0.876	-0.671	0.255	-0.683
25	24	2.52%	21.87%	11:13	0.919	0.638	1.992*	0.139
26	24	-0.76%	21.11%	11:13	0.093	0.086	-0.603	0.139
27	24	-0.63%	20.48%	10:14	0.241	0.211	-0.496	-0.272
28	24	0.50%	20.98%	14:10)	0.541	0.512	0.396	1.371$
29	24	-0.07%	20.91%	11:13	0.588	0.653	-0.053	0.139
30	24	0.46%	21.37%	11:13	0.87	0.855	0.364	0.139

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A19 Security, Commodity Brokerage, and Investment Companies

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	1362	0.99%	0.99%	761:601>>>	21.386***	11.163***	3.739***	6.973***
-29	1363	-0.62%	0.37%	584:779<<	-9.258***	-5.948***	-2.329**	-2.668**
-28	1363	-0.04%	0.33%	666:697>	-2.173*	-1.412$	-0.148	1.785*
-27	1363	0.27%	0.60%	671:692>	6.666***	3.973***	1.031	2.057*
-26	1363	-0.13%	0.47%	673:690>	-3.028**	-2.066*	-0.479	2.166*
-25	1363	-0.70%	-0.23%	633:730	-12.081***	-7.553***	-2.639**	-0.007
-24	1363	-0.15%	-0.38%	572:791<<<	-4.964***	-3.424***	-0.582	-3.320***
-23	1363	-0.18%	-0.56%	581:782<<	-2.817**	-1.891*	-0.694	-2.831**
-22	1363	0.23%	-0.33%	675:688>	9.103***	5.805***	0.856	2.274*
-21	1363	0.25%	-0.08%	647:716	5.571***	3.863***	0.937	0.753
-20	1363	0.07%	-0.01%	724:639>>>	1.623$	1.153	0.275	4.935***
-19	1363	0.64%	0.63%	709:654>>>	14.538***	9.368***	2.410**	4.121***
-18	1363	-0.27%	0.36%	527:836<<<	-2.888**	-1.900*	-1.034	-5.764***
-17	1363	0.67%	1.03%	704:659>>>	17.072***	9.906***	2.505**	3.849***
-16	1363	0.14%	1.17%	668:695>	4.541***	3.156***	0.529	1.894*
-15	1363	0.21%	1.38%	756:607>>>	2.501**	1.829*	0.78	6.673***
-14	1363	-0.12%	1.26%	593:770<	-1.058	-0.8	-0.446	-2.179*
-13	1363	0.21%	1.47%	719:644>>>	7.615***	5.312***	0.78	4.664***
-12	1363	0.14%	1.61%	704:659>>>	5.122***	3.829***	0.521	3.849***
-11	1363	0.45%	2.06%	842:521>>>	10.607***	6.672***	1.676*	11.344***
-10	1363	-0.50%	1.56%	678:685>>	-3.904***	-2.411**	-1.895*	2.437**
-9	1363	-0.29%	1.27%	585:778<<	-4.832***	-3.130***	-1.075	-2.614**
-8	1363	-1.17%	0.10%	539:824<<<	-22.059***	-11.151***	-4.410***	-5.112***
-7	1363	-0.60%	-0.50%	629:734	-10.436***	-4.033***	-2.266*	-0.224
-6	1363	-1.16%	-1.66%	519:844<<<	-25.246***	-12.015***	-4.379***	-6.198***
-5	1363	-1.93%	-3.59%	359:1004<<<	-44.323***	-16.877***	-7.280***	-14.888***
-4	1363	0.63%	-2.96%	648:715	7.128***	2.814**	2.381**	0.808
-3	1363	0.79%	-2.17%	731:632>>>	15.821***	7.650***	2.980**	5.316***
-2	1363	-0.22%	-2.39%	657:706)	-3.067**	-1.737*	-0.836	1.297$
-1	1363	-0.18%	-2.57%	568:795<<<	-1.629$	-1.075	-0.665	-3.537***
0	1363	0.55%	-2.02%	724:639>>>	11.891***	6.547***	2.060*	4.935***
1	1363	0.77%	-1.25%	744:619>>>	17.903***	9.454***	2.908**	6.022***

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2	1363	0.39%	-0.86%	644:719	7.150***	4.010***	1.481$	0.591
3	1363	0.89%	0.03%	778:585>>>	18.988***	11.460***	3.359***	7.868***
4	1363	-0.02%	0.01%	563:800<<<	-2.369**	-1.585$	-0.087	-3.809***
5	1363	0.02%	0.03%	594:769<	0.623	0.386	0.059	-2.125*
6	1361	0.40%	0.43%	739:622>>>	6.875***	4.243***	1.522$	5.805***
7	1360	0.37%	0.80%	666:694>	6.360***	4.107***	1.377$	1.863*
8	1360	0.06%	0.86%	699:661>>>	0.979	0.682	0.217	3.657***
9	1360	0.21%	1.07%	623:737	3.279***	2.433**	0.782	-0.475
10	1360	-0.01%	1.06%	565:795<<<	-1.747*	-1.386$	-0.039	-3.628***
11	1359	0.45%	1.51%	722:637>>>	9.966***	7.002***	1.709*	4.935***
12	1359	0.36%	1.87%	683:676>>	6.730***	4.557***	1.373$	2.814**
13	1359	0.21%	2.08%	666:693>	4.100***	3.296***	0.781	1.889*
14	1359	0.30%	2.38%	690:669>>>	7.244***	5.667***	1.128	3.194***
15	1359	0.00%	2.38%	579:780<<	-0.261	-0.2	-0.006	-2.843**
16	1359	0.26%	2.64%	605:754(	1.815*	1.25	0.969	-1.429$
17	1359	-0.10%	2.54%	669:690>	-0.531	-0.401	-0.383	2.052*
18	1359	-0.28%	2.26%	606:753(	-4.315***	-3.349***	-1.065	-1.374$
19	1359	0.06%	2.32%	690:669>>>	1.779*	1.451$	0.241	3.194***
20	1359	-0.12%	2.20%	634:725	0.16	0.12	-0.449	0.149
21	1358	-0.03%	2.17%	568:790<<<	-2.174*	-1.669*	-0.123	-3.417***
22	1358	-0.11%	2.06%	595:763<	-1.716*	-1.410$	-0.401	-1.948*
23	1358	0.04%	2.10%	582:776<<	0.844	0.702	0.163	-2.655**
24	1357	-0.07%	2.03%	574:783<<	-0.698	-0.571	-0.255	-3.067**
25	1358	-0.16%	1.87%	556:802<<<	-3.094***	-2.761**	-0.601	-4.070***
26	1358	0.07%	1.94%	587:771<<	0.205	0.158	0.258	-2.383**
27	1357	-0.32%	1.62%	515:842<<<	-7.285***	-5.724***	-1.201	-6.278***
28	1357	0.10%	1.72%	699:658>>>	2.583**	1.908*	0.376	3.737***
29	1357	0.25%	1.97%	585:772<<	1.359$	0.967	0.94	-2.468**
30	1355	0.01%	1.98%	562:793<<<	0.264	0.242	0.047	-3.672***

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A20 Metal Mining

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	113	-0.95%	-0.95%	37:76<<	-4.422***	-3.488***	-0.638	-2.947**
-29	113	-4.04%	-4.99%	33:80<<<	-9.740***	-6.572***	-2.709**	-3.702***
-28	113	-1.13%	-6.12%	55:58	-2.699**	-1.545$	-0.758	0.447
-27	113	-0.95%	-7.07%	56:57	-1.287$	-0.768	-0.639	0.636
-26	113	1.21%	-5.86%	62:51>	5.321***	2.315*	0.81	1.767*
-25	113	3.42%	-2.44%	72:41>>>	7.661***	4.170***	2.294*	3.653***
-24	113	5.07%	2.63%	77:36>>>	13.641***	6.316***	3.402***	4.596***
-23	113	7.00%	9.63%	91:22>>>	15.879***	7.851***	4.695***	7.236***
-22	113	-1.78%	7.85%	30:83<<<	-3.805***	-2.399**	-1.197	-4.268***
-21	113	-1.40%	6.45%	41:72<	-4.713***	-3.612***	-0.941	-2.193*
-20	113	5.19%	11.64%	81:32>>>	12.926***	6.008***	3.480***	5.350***
-19	113	6.12%	17.76%	50:63	5.724***	1.194	4.103***	-0.496
-18	113	-3.46%	14.30%	29:84<<<	-6.526***	-4.396***	-2.320*	-4.456***
-17	113	-1.03%	13.27%	44:69(	-0.263	-0.171	-0.692	-1.627$
-16	113	0.76%	14.03%	35:78<<<	-1.288$	-0.783	0.512	-3.325***
-15	113	1.65%	15.68%	75:38>>>	4.789***	3.395***	1.108	4.219***
-14	113	1.17%	16.85%	55:58	1.419$	1.181	0.784	0.447
-13	113	-0.57%	16.28%	41:72<	-1.895*	-1.580$	-0.381	-2.193*
-12	113	-1.54%	14.74%	48:65	-1.569$	-1.413$	-1.033	-0.873
-11	113	1.07%	15.81%	57:56	2.505**	1.921*	0.715	0.824
-10	113	4.66%	20.47%	85:28>>>	11.349***	6.562***	3.126***	6.105***
-9	113	2.61%	23.08%	63:50>	5.894***	3.445***	1.748*	1.956*
-8	113	2.14%	25.22%	67:46>>	6.174***	4.010***	1.434$	2.710**
-7	113	-0.08%	25.14%	58:55	0.165	0.116	-0.053	1.013
-6	113	0.35%	25.49%	66:47>>	1.672*	1.202	0.233	2.522**
-5	113	4.27%	29.76%	84:29>>>	8.923***	5.003***	2.866**	5.916***
-4	113	1.29%	31.05%	54:59	2.719**	2.125*	0.868	0.259
-3	113	-2.86%	28.19%	28:85<<<	-6.080***	-4.082***	-1.917*	-4.645***
-2	113	0.89%	29.08%	65:48>>	1.755*	1.331$	0.598	2.333**
-1	113	4.29%	33.37%	84:29>>>	12.753***	7.163***	2.875**	5.916***
0	113	-1.16%	32.21%	45:68(	-2.635**	-1.726*	-0.778	-1.439$
1	113	-3.30%	28.91%	24:89<<<	-7.485***	-4.263***	-2.215*	-5.399***

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2	113	-1.34%	27.57%	36:77<<<	-2.825**	-1.914*	-0.901	-3.136***
3	113	-0.56%	27.01%	51:62	-1.234	-0.962	-0.373	-0.307
4	113	-2.38%	24.63%	25:88<<<	-4.736***	-3.766***	-1.596$	-5.210***
5	113	0.76%	25.39%	51:62	1.337$	0.885	0.513	-0.307
6	112	2.53%	27.92%	71:41>>>	6.064***	3.339***	1.699*	3.568***
7	112	-1.43%	26.49%	35:77<<<	-3.877***	-2.251*	-0.96	-3.251***
8	112	0.76%	27.25%	65:47>>	3.199***	2.034*	0.51	2.432**
9	112	-0.29%	26.96%	46:66	-0.549	-0.377	-0.196	-1.167
10	112	-1.69%	25.27%	38:74<<	-3.687***	-2.822**	-1.133	-2.683**
11	112	1.06%	26.33%	64:48>	0.979	0.8	0.713	2.242*
12	112	0.64%	26.97%	48:64	0.317	0.221	0.431	-0.789
13	112	1.60%	28.57%	70:42>>>	4.918***	3.352***	1.076	3.379***
14	112	-0.69%	27.88%	54:58	-0.721	-0.542	-0.464	0.348
15	111	0.71%	28.59%	48:63	1.275	0.782	0.474	-0.704
16	110	0.59%	29.18%	54:56	1.488$	1.067	0.398	0.529
17	110	-0.11%	29.07%	31:79<<<	-1.813*	-1.236	-0.073	-3.867***
18	110	-0.76%	28.31%	50:60	-1.079	-0.813	-0.507	-0.235
19	110	4.41%	32.72%	74:36>>>	9.248***	5.809***	2.960**	4.352***
20	110	2.59%	35.31%	65:45>>	6.672***	4.529***	1.739*	2.632**
21	110	-1.82%	33.49%	40:70<	-1.945*	-1.535$	-1.224	-2.147*
22	109	0.50%	33.99%	43:66(	0.077	0.041	0.333	-1.491$
23	107	-0.39%	33.60%	44:63	-2.246*	-1.925*	-0.262	-1.131
24	107	0.48%	34.08%	53:54	0.297	0.247	0.322	0.614
25	107	1.77%	35.85%	73:34>>>	4.152***	3.601***	1.187	4.490***
26	107	-0.12%	35.73%	39:68<	-1.583$	-1.295$	-0.08	-2.100*
27	107	-3.28%	32.45%	22:85<<<	-6.312***	-4.800***	-2.198*	-5.394***
28	107	0.20%	32.65%	54:53	-0.002	-0.002	0.131	0.807
29	107	0.54%	33.19%	54:53	0.06	0.03	0.364	0.807
30	107	0.30%	33.49%	38:69<	-0.713	-0.583	0.2	-2.294*
(-30,-2)	14	-4.49%	-4.39%	6:08	-0.999	-0.641	-0.643	-0.345
(-1,0)	14	-6.46%	-4.30%	4:10(	-3.761***	-1.603$	-3.529***	-1.415$
(+1,+30)	14	25.65%	17.96%	13:1>>>	3.746***	4.137***	3.615***	3.402***

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A21 Bowling Centers

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	1	-0.04%	-0.04%	0:1	-0.02	-0.02	-0.02	-0.745
-29	1	0.93%	0.89%	1:0)	0.412	0.413	0.427	1.342$
-28	1	0.80%	1.69%	1:0)	0.363	0.365	0.367	1.342$
-27	1	-2.98%	-1.29%	0:1	-1.264	-1.269	-1.375$	-0.745
-26	1	0.55%	-0.74%	1:0)	0.247	0.248	0.254	1.342$
-25	1	-0.93%	-1.67%	0:1	-0.426	-0.428	-0.429	-0.745
-24	1	0.79%	-0.88%	1:0)	0.36	0.362	0.363	1.342$
-23	1	-1.72%	-2.60%	0:1	-0.787	-0.79	-0.792	-0.745
-22	1	3.85%	1.25%	1:0)	1.692*	1.699*	1.775*	1.342$
-21	1	-0.01%	1.24%	0:1	-0.004	-0.004	-0.004	-0.745
-20	1	-3.20%	-1.96%	0:1	-1.448$	-1.454$	-1.474$	-0.745
-19	1	-0.24%	-2.20%	0:1	-0.107	-0.107	-0.109	-0.745
-18	1	-0.20%	-2.40%	0:1	-0.093	-0.093	-0.094	-0.745
-17	1	-3.47%	-5.87%	0:1	-1.589$	-1.595$	-1.600$	-0.745
-16	1	1.58%	-4.29%	1:0)	0.723	0.726	0.728	1.342$
-15	1	0.02%	-4.27%	1:0)	0.01	0.01	0.011	1.342$
-14	1	0.73%	-3.54%	1:0)	0.333	0.334	0.335	1.342$
-13	1	-0.95%	-4.49%	0:1	-0.436	-0.438	-0.438	-0.745
-12	1	0.71%	-3.78%	1:0)	0.324	0.325	0.326	1.342$
-11	1	-0.27%	-4.05%	0:1	-0.121	-0.121	-0.124	-0.745
-10	1	0.00%	-4.05%	1:0)	0.002	0.002	0.002	1.342$
-9	1	-2.62%	-6.67%	0:1	-1.203	-1.208	-1.21	-0.745
-8	1	1.61%	-5.06%	1:0)	0.736	0.739	0.74	1.342$
-7	1	-0.09%	-5.15%	0:1	-0.042	-0.042	-0.042	-0.745
-6	1	5.12%	-0.03%	1:0)	2.316*	2.326*	2.360**	1.342$
-5	1	-1.54%	-1.57%	0:1	-0.692	-0.695	-0.711	-0.745
-4	1	-0.17%	-1.74%	0:1	-0.077	-0.078	-0.078	-0.745
-3	1	0.82%	-0.92%	1:0)	0.374	0.375	0.379	1.342$
-2	1	-0.07%	-0.99%	0:1	-0.034	-0.034	-0.034	-0.745
-1	1	-2.45%	-3.44%	0:1	-1.117	-1.121	-1.13	-0.745
0	1	-3.34%	-6.78%	0:1	-1.523$	-1.529$	-1.541$	-0.745
1	1	-1.96%	-8.74%	0:1	-0.888	-0.891	-0.904	-0.745

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2	1	-0.19%	-8.93%	0:1	-0.085	-0.086	-0.086	-0.745
3	1	3.44%	-5.49%	1:0)	1.576$	1.583$	1.587$	1.342$
4	1	0.68%	-4.81%	1:0)	0.309	0.311	0.312	1.342$
5	1	-2.83%	-7.64%	0:1	-1.26	-1.265	-1.306$	-0.745
6	1	1.57%	-6.07%	1:0)	0.718	0.721	0.724	1.342$
7	1	-1.33%	-7.40%	0:1	-0.609	-0.611	-0.613	-0.745
8	1	-0.99%	-8.39%	0:1	-0.452	-0.454	-0.455	-0.745
9	1	1.63%	-6.76%	1:0)	0.745	0.748	0.75	1.342$
10	1	0.72%	-6.04%	1:0)	0.328	0.329	0.331	1.342$
11	1	0.79%	-5.25%	1:0)	0.36	0.361	0.362	1.342$
12	1	-0.97%	-6.22%	0:1	-0.445	-0.447	-0.448	-0.745
13	1	0.78%	-5.44%	1:0)	0.356	0.357	0.358	1.342$
14	1	-0.96%	-6.40%	0:1	-0.44	-0.442	-0.443	-0.745
15	1	-4.45%	-10.85%	0:1	-2.033*	-2.041*	-2.054*	-0.745
16	1	1.62%	-9.23%	1:0)	0.74	0.743	0.747	1.342$
17	1	-1.93%	-11.16%	0:1	-0.881	-0.885	-0.89	-0.745
18	1	-0.10%	-11.26%	0:1	-0.044	-0.044	-0.044	-0.745
19	1	-0.15%	-11.41%	0:1	-0.067	-0.068	-0.068	-0.745
20	1	-0.16%	-11.57%	0:1	-0.075	-0.075	-0.075	-0.745
21	1	-0.13%	-11.70%	0:1	-0.062	-0.062	-0.062	-0.745
22	1	1.73%	-9.97%	1:0)	0.791	0.794	0.797	1.342$
23	1	3.42%	-6.55%	1:0)	1.567$	1.573$	1.576$	1.342$
24	1	-1.76%	-8.31%	0:1	-0.807	-0.81	-0.812	-0.745
25	1	-1.81%	-10.12%	0:1	-0.83	-0.833	-0.835	-0.745
26	1	-1.00%	-11.12%	0:1	-0.46	-0.462	-0.463	-0.745
27	1	2.52%	-8.60%	1:0)	1.152	1.157	1.16	1.342$
28	1	0.75%	-7.85%	1:0)	0.342	0.343	0.344	1.342$
29	1	-0.98%	-8.83%	0:1	-0.45	-0.451	-0.452	-0.745
30	1	-1.86%	-10.69%	0:1	-0.853	-0.856	-0.859	-0.745
(-30,-2)	1	-1.01%	-1.01%	0:1	-0.081	-0.081	-0.087	-0.745
(-1,0)	1	-5.79%	-5.79%	0:1	-1.859*	-1.859*	-1.889*	-0.745
(+1,+30)	1	-3.95%	-3.95%	0:1	-0.308	-0.308	-0.333	-0.745

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A22 Sawmills, Planning mills and Workmills

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	4	-1.08%	-1.08%	1:3	-1.105	-1.988*	-0.977	-0.942
-29	4	1.13%	0.05%	3:1	1.235	2.021*	1.025	1.059
-28	4	0.65%	0.70%	3:1	0.714	1.015	0.585	1.059
-27	4	3.12%	3.82%	3:1	3.140***	2.257*	2.815**	1.059
-26	4	-1.55%	2.27%	2:2	-1.807*	-0.578	-1.401$	0.059
-25	4	0.01%	2.28%	1:3	0.039	0.027	0.013	-0.942
-24	4	-0.27%	2.01%	2:2	-0.425	-0.355	-0.247	0.059
-23	4	3.37%	5.38%	4:0>	3.286***	2.018*	3.047**	2.060*
-22	4	-0.08%	5.30%	1:3	0.033	0.028	-0.075	-0.942
-21	4	-0.02%	5.28%	2:2	-0.092	-0.182	-0.02	0.059
-20	4	0.29%	5.57%	2:2	0.233	0.353	0.26	0.059
-19	4	-1.94%	3.63%	0:4<	-1.989*	-10.117***	-1.756*	-1.942*
-18	4	2.05%	5.68%	4:0>	2.117*	3.101***	1.849*	2.060*
-17	4	1.29%	6.97%	3:1	1.409$	1.164	1.169	1.059
-16	4	0.46%	7.43%	3:1	0.53	1.468$	0.419	1.059
-15	4	1.67%	9.10%	4:0>	1.689*	5.275***	1.512$	2.060*
-14	4	-0.28%	8.82%	2:2	-0.155	-0.167	-0.249	0.059
-13	4	-0.06%	8.76%	3:1	-0.051	-0.06	-0.057	1.059
-12	4	3.33%	12.09%	4:0>	3.309***	2.832**	3.010**	2.060*
-11	4	-0.50%	11.59%	2:2	-0.685	-0.397	-0.447	0.059
-10	4	1.85%	13.44%	2:2	1.958*	1.303$	1.670*	0.059
-9	4	-0.88%	12.56%	3:1	-0.784	-0.767	-0.79	1.059
-8	4	0.51%	13.07%	2:2	0.537	0.702	0.461	0.059
-7	4	-0.69%	12.38%	0:4<	-0.674	-1.852*	-0.625	-1.942*
-6	4	-0.39%	11.99%	2:2	-0.403	-1.101	-0.351	0.059
-5	4	1.51%	13.50%	4:0>	1.612$	3.071**	1.362$	2.060*
-4	4	-0.33%	13.17%	2:2	-0.229	-0.218	-0.3	0.059
-3	4	-1.12%	12.05%	1:3	-1.165	-0.947	-1.011	-0.942
-2	4	0.21%	12.26%	2:2	0.12	0.071	0.185	0.059
-1	4	2.38%	14.64%	4:0>	2.550**	3.562***	2.150*	2.060*
0	4	0.64%	15.28%	1:3	0.873	0.459	0.581	-0.942
1	4	-0.38%	14.90%	2:2	-0.587	-0.379	-0.339	0.059

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2	4	1.40%	16.30%	4:0>	1.434$	2.366**	1.263	2.060*
3	4	-0.53%	15.77%	1:3	-0.688	-0.818	-0.481	-0.942
4	4	0.31%	16.08%	2:2	0.328	0.308	0.282	0.059
5	4	-3.79%	12.29%	0:4<	-3.760***	-3.426***	-3.427***	-1.942*
6	4	0.83%	13.12%	4:0>	0.847	2.430**	0.746	2.060*
7	4	1.28%	14.40%	2:2	1.417$	0.649	1.152	0.059
8	4	0.36%	14.76%	3:1	0.4	0.311	0.321	1.059
9	4	-0.22%	14.54%	1:3	-0.307	-0.329	-0.195	-0.942
10	4	-1.17%	13.37%	2:2	-1.297$	-1.178	-1.054	0.059
11	4	-2.38%	10.99%	0:4<	-2.477**	-5.584***	-2.152*	-1.942*
12	4	1.38%	12.37%	3:1	1.523$	0.972	1.245	1.059
13	4	0.02%	12.39%	2:2	-0.095	-0.1	0.023	0.059
14	4	-0.38%	12.01%	2:2	-0.379	-0.698	-0.342	0.059
15	4	-0.52%	11.49%	1:3	-0.561	-2.158*	-0.465	-0.942
16	4	-0.03%	11.46%	1:3	-0.08	-0.063	-0.028	-0.942
17	4	0.38%	11.84%	3:1	0.464	0.819	0.345	1.059
18	4	1.05%	12.89%	3:1	1.305$	0.89	0.947	1.059
19	4	1.15%	14.04%	3:1	1.129	0.878	1.036	1.059
20	4	0.32%	14.36%	3:1	0.335	1.396$	0.291	1.059
21	4	0.09%	14.45%	2:2	0.14	0.445	0.084	0.059
22	4	-0.76%	13.69%	2:2	-0.853	-1.28	-0.682	0.059
23	4	-0.09%	13.60%	2:2	-0.05	-0.088	-0.077	0.059
24	4	-1.22%	12.38%	0:4<	-1.288$	-3.447***	-1.106	-1.942*
25	4	0.19%	12.57%	3:1	0.261	0.495	0.175	1.059
26	4	-1.21%	11.36%	1:3	-1.182	-0.759	-1.093	-0.942
27	4	0.48%	11.84%	3:1	0.461	0.623	0.43	1.059
28	4	-2.23%	9.61%	1:3	-2.210*	-1.041	-2.017*	-0.942
29	4	-0.09%	9.52%	2:2	-0.154	-0.265	-0.084	0.059
30	4	-0.22%	9.30%	1:3	-0.348	-0.438	-0.196	-0.942
(-30,-2)	4	12.26%	12.01%	4:0>	2.226*	2.962**	2.057*	2.060*
(-1,0)	4	3.02%	3.26%	3:1	2.411**	1.309$	1.931*	1.059
(+1,+30)	4	-5.98%	-6.04%	0:4<	-1.087	-2.129*	-0.986	-1.942*

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A23 Nonmetallic Mining and Quarrying, except Fuels

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	5	2.08%	2.08%	2:3	0.138	0.09	0.961	-0.416
-29	5	-2.06%	0.02%	1:4(	-0.55	-0.442	-0.951	-1.310$
-28	5	1.29%	1.31%	3:2	0.953	0.596	0.598	0.479
-27	5	6.97%	8.28%	5:0>	3.295***	4.073***	3.224***	2.268*
-26	5	0.33%	8.61%	3:2	0.844	0.601	0.154	0.479
-25	5	-0.33%	8.28%	3:2	-0.441	-0.497	-0.154	0.479
-24	5	5.31%	13.59%	3:2	2.091*	0.8	2.457**	0.479
-23	5	5.69%	19.28%	3:2	2.136*	1.162	2.632**	0.479
-22	5	-1.54%	17.74%	2:3	-0.969	-0.453	-0.711	-0.416
-21	5	-0.26%	17.48%	2:3	-0.03	-0.019	-0.121	-0.416
-20	5	4.75%	22.23%	4:1)	1.996*	1.277	2.195*	1.373$
-19	5	-1.70%	20.53%	0:5<	-1.253	-4.032***	-0.785	-2.205*
-18	5	-2.14%	18.39%	2:3	0.155	0.089	-0.99	-0.416
-17	5	-3.49%	14.90%	2:3	-1.195	-1.053	-1.613$	-0.416
-16	5	3.17%	18.07%	4:1)	-0.711	-0.217	1.467$	1.373$
-15	5	1.73%	19.80%	3:2	1.887*	1.178	0.799	0.479
-14	5	0.41%	20.21%	2:3	0.846	0.546	0.191	-0.416
-13	5	-4.29%	15.92%	1:4(	-1.883*	-1.935*	-1.985*	-1.310$
-12	5	3.76%	19.68%	3:2	0.682	0.514	1.740*	0.479
-11	5	-2.62%	17.06%	0:5<	-2.159*	-3.387***	-1.209	-2.205*
-10	5	4.26%	21.32%	3:2	1.310$	1.339$	1.971*	0.479
-9	5	-0.68%	20.64%	2:3	-0.965	-1.167	-0.316	-0.416
-8	5	-0.67%	19.97%	3:2	-0.143	-0.077	-0.31	0.479
-7	5	0.70%	20.67%	3:2	0.651	0.635	0.323	0.479
-6	5	-3.77%	16.90%	2:3	-1.586$	-0.88	-1.744*	-0.416
-5	5	9.24%	26.14%	4:1)	3.679***	2.041*	4.273***	1.373$
-4	5	-2.11%	24.03%	2:3	-0.483	-0.28	-0.978	-0.416
-3	5	1.61%	25.64%	4:1)	1.391$	2.331**	0.744	1.373$
-2	5	0.10%	25.74%	3:2	-0.882	-0.368	0.045	0.479
-1	5	3.31%	29.05%	3:2	0.876	0.829	1.532$	0.479
0	5	2.45%	31.50%	3:2	0.822	0.484	1.132	0.479
1	5	-3.06%	28.44%	2:3	-1.041	-0.834	-1.415$	-0.416

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2	5	-1.82%	26.62%	1:4(	0.257	0.121	-0.841	-1.310$
3	5	3.98%	30.60%	3:2	1.900*	1.621$	1.842*	0.479
4	5	-1.90%	28.70%	2:3	-0.122	-0.104	-0.877	-0.416
5	5	-0.48%	28.22%	3:2	0.055	0.082	-0.221	0.479
6	5	3.09%	31.31%	3:2	0.46	0.096	1.429$	0.479
7	5	-1.77%	29.54%	2:3	-0.09	-0.048	-0.817	-0.416
8	5	4.03%	33.57%	3:2	1.843*	1.338$	1.862*	0.479
9	5	-0.81%	32.76%	2:3	-0.74	-0.895	-0.375	-0.416
10	5	0.45%	33.21%	3:2	0.874	0.755	0.206	0.479
11	5	0.14%	33.35%	4:1)	0.071	0.17	0.064	1.373$
12	5	-2.47%	30.88%	2:3	-0.835	-0.827	-1.143	-0.416
13	5	1.96%	32.84%	2:3	-0.073	-0.04	0.905	-0.416
14	5	-3.38%	29.46%	0:5<	-1.555$	-2.387**	-1.565$	-2.205*
15	5	0.04%	29.50%	3:2	-0.166	-0.126	0.02	0.479
16	5	0.49%	29.99%	2:3	0.388	0.326	0.226	-0.416
17	5	1.40%	31.39%	4:1)	1.670*	1.540$	0.649	1.373$
18	5	0.72%	32.11%	3:2	0.584	1.498$	0.334	0.479
19	5	0.70%	32.81%	2:3	0.283	0.174	0.322	-0.416
20	5	-2.91%	29.90%	2:3	-0.72	-0.814	-1.344$	-0.416
21	5	-0.18%	29.72%	2:3	-0.464	-0.285	-0.083	-0.416
22	5	0.64%	30.36%	4:1)	0.553	1.084	0.297	1.373$
23	5	-1.67%	28.69%	1:4(	-1.735*	-3.252***	-0.77	-1.310$
24	5	5.36%	34.05%	5:0>	2.940**	4.664***	2.477**	2.268*
25	5	-2.72%	31.33%	3:2	-0.448	-0.396	-1.26	0.479
26	5	-3.12%	28.21%	3:2	-0.765	-0.707	-1.445$	0.479
27	5	2.28%	30.49%	3:2	2.308*	0.867	1.055	0.479
28	5	3.75%	34.24%	2:3	0.765	0.66	1.736*	-0.416
29	5	2.00%	36.24%	2:3	-0.718	-0.464	0.926	-0.416
30	5	-3.80%	32.44%	1:4(	-2.028*	-1.748*	-1.758*	-1.310$
(-30,-2)	5	25.74%	9.86%	4:1)	1.456$	0.922	2.211*	1.373$
(-1,0)	5	5.76%	1.82%	2:3	1.2	0.689	1.884*	-0.416
(+1,+30)	5	0.94%	3.64%	3:2	1.484$	0.661	0.08	0.479

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.

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Table A24 Farm-products Raw Materials

Day	N	Mean Abnormal Return	Cumulative Mean Abnormal Return	Positive: Negative	Standard Normal Test	Standard Cross-section Test	Time-Series (CDA) t Test	Generalized Sign Test
-30	3	2.06%	2.06%	2:1	1.594$	1.109	1.750*	0.508
-29	3	0.82%	2.88%	1:2	0.502	0.481	0.697	-0.648
-28	3	-0.19%	2.69%	1:2	-0.36	-0.357	-0.159	-0.648
-27	3	2.20%	4.89%	3:0>	1.775*	4.231***	1.877*	1.663*
-26	3	0.89%	5.78%	2:1	0.479	0.29	0.758	0.508
-25	3	1.93%	7.71%	2:1	1.406$	0.343	1.643$	0.508
-24	3	0.00%	7.71%	2:1	-0.014	-0.028	-0.001	0.508
-23	3	0.47%	8.18%	2:1	0.312	0.417	0.404	0.508
-22	3	-0.46%	7.72%	1:2	-0.358	-1.285$	-0.396	-0.648
-21	3	-1.26%	6.46%	0:3<	-1.07	-2.251*	-1.074	-1.804*
-20	3	0.94%	7.40%	2:1	0.76	1.673*	0.797	0.508
-19	3	0.08%	7.48%	2:1	-0.046	-0.032	0.069	0.508
-18	3	1.84%	9.32%	2:1	1.453$	1.194	1.571$	0.508
-17	3	-0.12%	9.20%	2:1	0.185	0.109	-0.106	0.508
-16	3	0.36%	9.56%	1:2	0.185	0.251	0.311	-0.648
-15	3	0.97%	10.53%	2:1	0.998	1.500$	0.829	0.508
-14	3	2.74%	13.27%	3:0>	2.287*	2.531**	2.331**	1.663*
-13	3	0.52%	13.79%	2:1	0.658	0.548	0.446	0.508
-12	3	2.15%	15.94%	2:1	1.568$	0.719	1.827*	0.508
-11	3	-2.13%	13.81%	0:3<	-1.724*	-1.840*	-1.818*	-1.804*
-10	3	0.26%	14.07%	2:1	0.206	0.49	0.218	0.508
-9	3	-1.90%	12.17%	0:3<	-1.679*	-2.366**	-1.619$	-1.804*
-8	3	0.37%	12.54%	2:1	0.454	0.643	0.314	0.508
-7	3	-1.92%	10.62%	1:2	-1.700*	-1.545$	-1.638$	-0.648
-6	3	-1.38%	9.24%	1:2	-1.515$	-0.986	-1.171	-0.648
-5	3	1.29%	10.53%	2:1	1.464$	0.779	1.102	0.508
-4	3	0.60%	11.13%	2:1	0.38	0.4	0.513	0.508
-3	3	0.17%	11.30%	2:1	-0.056	-0.043	0.146	0.508
-2	3	-1.56%	9.74%	1:2	-1.199	-1.069	-1.325$	-0.648
-1	3	1.03%	10.77%	2:1	1.118	0.911	0.875	0.508
0	3	-0.42%	10.35%	1:2	-0.485	-0.897	-0.359	-0.648
1	3	0.26%	10.61%	1: 2	-0.104	-0.061	0.223	-0.648

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2	3	-1.74%	8.87%	1:2	-1.447$	-1.799*	-1.480$	-0.648
3	3	1.49%	10.36%	2:1	1.093	0.634	1.266	0.508
4	3	-0.09%	10.27%	1:2	-0.023	-0.018	-0.073	-0.648
5	3	-1.14%	9.13%	1:2	-1.12	-1.047	-0.973	-0.648
6	3	-0.53%	8.60%	1:2	-0.642	-0.736	-0.448	-0.648
7	3	1.57%	10.17%	2:1	1.431$	1.214	1.340$	0.508
8	3	3.88%	14.05%	3:0>	3.242***	2.777**	3.302***	1.663*
9	3	5.51%	19.56%	3:0>	4.901***	2.174*	4.694***	1.663*
10	3	-0.86%	18.70%	0:3<	-0.838	-2.300*	-0.734	-1.804*
11	3	-0.50%	18.20%	2:1	-0.508	-0.677	-0.426	0.508
12	3	-0.10%	18.10%	2:1	-0.059	-0.385	-0.086	0.508
13	3	2.72%	20.82%	3:0>	2.362**	2.378**	2.318*	1.663*
14	3	-1.02%	19.80%	1:2	-0.921	-0.608	-0.867	-0.648
15	3	1.19%	20.99%	3:0>	1.159	2.228*	1.01	1.663*
16	3	-1.20%	19.79%	1:2	-1.178	-0.821	-1.023	-0.648
17	3	-0.19%	19.60%	2:1	-0.349	-0.266	-0.163	0.508
18	3	1.69%	21.29%	1:2	1.793*	0.736	1.437$	-0.648
19	3	0.69%	21.98%	2:1	0.708	1.454$	0.585	0.508
20	3	-0.88%	21.10%	1:2	-0.575	-0.378	-0.745	-0.648
21	3	-1.02%	20.08%	1:2	-0.809	-0.698	-0.869	-0.648
22	3	-0.92%	19.16%	1:2	-0.782	-1.232	-0.785	-0.648
23	3	2.42%	21.58%	2:1	1.864*	1.046	2.063*	0.508
24	3	-1.39%	20.19%	1:2	-1.022	-0.684	-1.183	-0.648
25	3	-11.15%	9.04%	0:3<	-8.834***	-1.481$	-9.492***	-1.804*
26	3	-0.06%	8.98%	1:2	-0.059	-0.113	-0.049	-0.648
27	3	-2.09%	6.89%	0:3<	-1.656*	-1.445$	-1.784*	-1.804*
28	3	0.14%	7.03%	2:1	0.323	0.327	0.123	0.508
29	3	-0.90%	6.13%	0:3<	-0.886	-1.325$	-0.763	-1.804*
30	3	-0.20%	5.93%	1:2	-0.32	-0.366	-0.17	-0.648
(-30,-2)	3	9.74%	7.78%	2:1	1.247	0.623	1.541$	0.508
(-1,0)	3	0.61%	0.70%	1:2	0.446	0.75	0.366	-0.648
(+1,+30)	3	-4.41%	-3.61%	1:2	-0.562	-0.37	-0.685	-0.648

Note: The symbols $, *, **, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001levels, respectively, using a generic one-tail test. The symbols (, < or), > etc. correspond to $,* and show the direction and generic one-tail significance of the generalized sign test.