INFLATION AND PRICE DISPERSION IN EQUITY MARKETS AND IN GOODS AND SERVICES MARKETS

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Abstract

We reexamine the empirical link between inflation and relative price dispersion, and we reconsider its standard interpretations. The most prominent studies interpret the link in terms either of menu costs models, such as Sheshinski and Weiss (1977), or of imperfect information models, such as Lucas (1973). While these models both imply that the inflation-dispersion link should exist in markets for goods and services, they imply no such link in the stock market. Thus, the stock market provides a natural benchmark for reassessing these interpretations. We find that an inflation-dispersion link – comparable to that found in other markets – does exist in the stock market. We also examine whether we can attribute the results to small sample biases. We find an important but generally overlooked bias that is present in many existing studies. However, the bias alone cannot explain the strength of our own findings in either the stock market or the markets for goods and services.

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1. Introduction

Inflation has been linked to the variability of relative prices across many time periods and countries, and with many specifications.[1] This finding is important because it appears to be at odds with the classical dichotomy of real and nominal variables, and, correspondingly, because it highlights major macroeconomic policy questions.

In the search to explain this finding, two competing approaches have risen to prominence. The first, well-known approach relies on imperfect information, and the other relies on nominal rigidities. In the first approach, which stems from Lucas (1973), individuals temporarily lack the information they need to distinguish between relative and nominal price changes, so they provisionally ascribe part of any unexpected nominal price change to relative price changes. Consequently, unexpected inflation alters relative prices. The second prominent approach, beginning with the work of Sheshinski and Weiss (1977), emphasizes the costs of price adjustment in imperfectly competitive markets. In this new-Keynesian approach, inflation alters relative prices through the nominal rigidities associated with menu costs.

In this study, we merely add to the empirical landslide of results indicating that, yes, aggregate price changes are positively linked to the dispersion of relative prices. Yet, our key

[1] See for example, Mills (1927), Viner (1926), and Vining and Elwertowski (1976), who updated Mills' work. More recent studies include: Fielding and Mizen (2000), Debelle and Lamont (1997), Parsley (1996), Lach and Tsiddon (1992), Van Hoomissen (1988), Domberger (1987), Fischer (1981), Hercowitz (1981), Parks (1978). A notable exception to the usual finding of a positive correlation is Reinsdorf (1994), who finds a negative correlation for the United States during the 1980-82 disinflation.

finding prompts us to take a step away from the two prominent explanations of the earlier results. We examine panels of equity prices from the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotation (NASDAQ), alongside a panel of U.S. prices of goods and services.[2] We find that overall price changes and price dispersion appear to be as closely linked in the equity markets as they are in markets for goods and services. This result presents a puzzle since, at the horizons we examine, both of the prominent approaches predict the link only in goods and services markets, not in the stock market.

The applicability of the new-Keynesian approach to the stock market is limited by its reliance on the assumptions of imperfect competition and nonsynchronous timing. Imperfect competition is central to the price setting that brings about the nominal rigidities of this approach. While the assumption of imperfect competition may be appropriate in the markets for many goods and services, it is less descriptive of U.S. equity markets, where trade takes place in something much closer to perfect competition.[3] The new-Keynesian approach also relies on asynchronous timing of price changes, a reliance that also would be misplaced in the U.S. equity markets, which are characterized by nearly continuous price changes. Thus, like the imperfect information approach, the new-Keynesian approach can explain the findings in

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[2] There is also a long history of theoretical and empirical studies examining the impact of inflation on stock returns. Indeed, the Capital Asset Pricing Model predicts that assets with higher return variability will compensate investors in equilibrium with a higher mean return. However, our purpose here is to study the time-series inflation/dispersion linkage (for a given portfolio) as opposed to establishing a cross-sectional linkage among stocks. Ultimately, we wish to compare our findings in equity markets with those in markets for goods and services.

[3] Even granting some degree of imperfect competition in U.S. equity markets, the new-Keynesian approach does not explain the puzzle. Imperfect competition is presumably still less important in equity markets than in many of the markets for goods and services. So, the new-Keynesian approach would predict that the inflation-dispersion link found in equity prices would be notably weaker than – not roughly the same as – the link found in the prices of goods and services.

the goods and services markets, but it cannot explain the comparable links that we find in equity markets.

The relevance of the imperfect information approach to the stock market is limited by the timing of the informational imperfections. In the imperfect information models, relative price effects last only as long as does the inability to observe the overall change in the price level. If this informational imperfection dissipates in equity markets after a day, it cannot explain the equity link, which arises over horizons of a quarter and more. While it is certainly plausible that individual equity suppliers – traders or market makers focusing on a single stock – could be unaware of overall changes in equity prices over the course of minutes or hours, it is less plausible that their inability to distinguish between overall and relative changes in equity prices could last as long as a full day, week, month, or quarter. Thus, while the imperfect information approach predicts an inflation-dispersion link in goods and services markets, it does not predict a comparable link in equity markets.

Because of these limitations, the two explanations must be set aside when trying to understand the inflation-dispersion link we find in the equity markets. While the two approaches seem compelling in other respects, our results suggest to us that inflation-dispersion links found elsewhere also should not automatically be interpreted as supporting one or the other of them.[4]

[4] Other work trying to pit these two approaches against each other has relied primarily on the differing implications that the two approaches have for the roles of expected, unexpected, and actual inflation. Bomberger (1999) provides a critical summary of such work and suggests avenues for improving the decisiveness of their tests. Unfortunately, as noted by Hartman (1981), such work has been hampered by the fact that there is little agreement over the appropriate methods for separating inflation into its expected and unexpected components. (Grier and Perry, 1996, are a notable exception, providing inroads into the separation of the two components in this context.)

Hartman (1981) has argued that, because the inflation variables appear to be tied *definitionally* to price dispersion, some of the published inflation-dispersion links are simply statistical artifacts that have arisen from inappropriate empirical specifications. We investigate related problems in our own specification using Monte Carlo simulations of a naïve model. While we find that small sample biases do arise, the biases are not large enough to explain the strength of the links that we estimate.

The next section discusses the data and provides some summary statistics. As a benchmark, we estimate the inflation/dispersion relation using individual goods price data sampled from U.S. cities. Focusing on individual price data (as opposed to price index data) makes the analysis more compelling since price indexes may introduce measurement error into the estimation – thus potentially biasing the estimates.[5] Additionally, a comparison with equity prices is facilitated using price level data. Thus, by design, we construct panels of equity prices to correspond structurally with citywide panels of goods and services prices, and we use identical specifications in studying both equity prices and the goods and services prices. Section 3 discusses some estimation issues and describes the methods we use as well as our Monte Carlo simulations. Section 4 discusses the results of the estimation. Finally, section 5 provides a brief discussion of our results in the context of other, related empirical work and in the context of more recent theoretical approaches, and it describes some possible avenues for future research.

[5] This problem is discussed in Danziger (1987).

2. Data and Summary Statistics

We construct two panels of equity prices, and three panels of goods and services prices using quarterly observations of prices from 1975 through 1999. All equity prices were taken from the Center for Research in Security Prices Database (CRSP). Since we have roughly 50 goods and services prices, we chose 50 price series from each equity market. For the first equity-price panel (the NYSE), we selected the equities by ranking all listed stocks by their liquidity, as measured by numbers of trades, in the first and last year of our study (1975 and 1999), and keeping the top 25 percent in each year. Of these, we selected stocks that appeared in both years; then, we randomly chose 50 of those that remained. In order to focus solely on price movements, we excluded dividends from the price change calculations. This same procedure was followed for the second equity-price panel – i.e., NASDAQ market, but only 35 stocks met the criteria. We augmented the sample by including the next 15 most liquid stocks (in 1999). The companies and some descriptive statistics are given in Tables A1 and A2.

The source for the U.S. individual goods and services price data is the *Cost of Living Index* published by the American Chamber of Commerce Researchers Association. This data source is described in more detail in Parsley (1996), where a subset of this paper's dataset was analyzed. We construct three goods-price panels: a national panel using all 48 U.S. cities and 51 goods and services in the data set, and two city-wide panels. In order to create a benchmark panel that corresponds closely with the structure of the equity panels, we focus on data from a single city. We first examine New York City because it is a natural benchmark for comparison with the NYSE. However, the New York sample has more than the average number of missing values. So, we also examine Houston, which has the fewest missing values.

Each quarterly issue of the *Cost of Living Index* reports prices from a cross section of U.S. cities (currently exceeding 300). We selected the U.S. cities that appeared in roughly 90 percent of the quarterly surveys. Table A3 lists these cities, and table A4 lists the goods and services, along with some descriptive statistics for our U.S. panel as a whole. Descriptive statistics, including the number of observations, of the New York and Houston panels are provided in Tables A5 and A6.

For each of the equity and the goods and services markets, Figures 1 and 2 track the average rate of change of prices, which we denote π_t and the price dispersion, which we denote $\hat{\sigma}_t^2$ over the 25-year sample period. Following Vining and Elwertowski (1976), Parks (1978), and others, we measure the dispersion using the cross-sectional variance of the rate of change of prices. Specifically, in each market, the average rate of price change in the tth period is: $\pi_t = \frac{1}{N}\sum_{n=1}^{N}\pi_{nt}$, where π_{nt} denotes the tth period rate of change in the price of the nth item, whether a good or service, or an equity; and N denotes the total number of items in the sample. So, our dispersion measure is: $\hat{\sigma}_t^2 = \frac{1}{N}\sum_{n=1}^{N}\left(\pi_{nt} - \pi_t\right)^2$. We also examine weighted versions for use in estimation. We describe the weighting in section 4.

Figures 3 and 4 give a somewhat more direct visual sense of the link between overall price changes and dispersion. These figures plot π_t (on the horizontal axis) against $\hat{\sigma}_t^2$ within each market over the entire sample. The top panel of Figure 3 plots the figures for the NYSE; and the bottom panel plots them for the NASDAQ. Figure 4 presents similar plots for prices in the goods and services markets, with averages from the full U.S. in the top panel, followed by observations from New York and Houston. In many other studies, such scatter diagrams suggest a "V"-shaped pattern.[6] That is, observations of relatively large magnitudes of π_t – regardless of whether they are positive or negative – correspond to periods of relatively high dispersion, $\hat{\sigma}_t^2$. There is arguably some indication of such a pattern in our data as well, though it is certainly not striking. What is somewhat more apparent in the scatter plots is a lack of symmetry. We keep the potential V-shape and asymmetry in mind in the next section, where we explore the relationship between π_t and $\hat{\sigma}_t^2$ more systematically.

3. Empirical Specification

The many existing empirical studies of the link between π_t and $\hat{\sigma}_t^2$ in markets for goods and services have employed many specifications.[7] While some studies have restricted themselves to linear regressions of $\hat{\sigma}_t^2$ on various measures of π_t, others have attempted to capture the "V" pattern. Typically, these others have used either the square of π_t or its absolute value. Central to the concern over the choice of specification has been the tension between trying to capture differing roles of positive and negative inflation, on the one hand, and concern over inadvertently introducing bias through nonlinear specifications, on the other. While Bomberger (1999) has emphasized the theoretical inappropriateness of using only a linear inflation term, and thereby ignoring the "V" pattern and its theoretical underpinnings, Hartman (1991) has shown that some of the familiar nonlinear specifications can produce misleading results.

[6] See, for example, Tommasi (1988) and Debelle and Lamont (1997).
[7] Bomberger (1999) catalogues the wide range of empirical specifications.

In this paper, we are concerned with preserving the distinction between the positive and negative observations of π_t in the data, and we also are concerned with avoiding the pitfalls of some of the nonlinear specifications. So, we adopt a very simple specification that nevertheless treats positive and negative values of π_t differently; then, recognizing the potential importance of small sample biases, we use Monte Carlo simulations to assess the statistical significance of our estimates in the finite samples that are available to us. Later, we also modify our definitions of π_t and $\hat{\sigma}_t^2$ somewhat by weighting individual price changes, and we also examine what happens to the empirical link between $\hat{\sigma}_t^2$ and π_t over longer time horizons.

Our formulation starts with the simple linear regression of $\hat{\sigma}_t^2$ on π_t but allows for negative and positive values of π_t to have different effects.[8] Specifically, we estimate the following regression:

$$(1) \qquad \hat{\sigma}_t^2 = \alpha_0 + \alpha_1 \pi_t^+ + \alpha_2 \pi_t^- + u_t$$

where $\pi_t^+ = \pi_t$ when $\pi_t \geq 0$; and $\pi_t^- = \pi_t$ when $\pi_t < 0$. We estimate this equation separately for each of the sets of stock market prices, and for the goods and services markets of New York City and of Houston. For the full panel of U.S. goods and services markets, we follow Parsley (1996) and Debelle and Lamont (1997) in adding dummies to capture city and time effects, as follows:

$$(2) \qquad \hat{\sigma}_t^2 = \alpha_c' d_c + \alpha_t' d_t + \alpha_1 \pi_t^+ + \alpha_2 \pi_t^- + u_t$$

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[8] This formulation is in keeping with the asymmetry found in earlier studies of goods markets. See Fischer (1981), for example.

where d_c and d_t are vectors of city and time dummies. In all of these regressions, we are interested in the value and significance of α_1 and of α_2.

To assess the magnitude of the small sample bias implied by our specification, we simulate equation 1 using artificial data. Each simulation uses a sample of 50 vectors of price changes with 100 observations (N=50 and T=100). Each vector of price changes is independently drawn from a multivariate normal distribution with a mean of zero and a variance that itself is drawn randomly.

The fact that we allow prices to be drawn from different normal distributions is important here. Because of it, we find that a positive small sample bias arises in our Monte Carlo simulations even in the simple regression of $\hat{\sigma}_t^2$ on π_t^2. This characteristic of our model and the corresponding bias distinguish our work from that of others, who have used the standard, simplifying (but implausible) assumption that the variances of all of the price changes are the same. When each of the underlying N prices is independently normally distributed with a mean of zero and an idiosyncratic variance, σ_n^2, then

$E(\hat{\sigma}_t^2\pi_t^2) = \frac{3}{(N-1)N^2}\left[\sum_{n=1}^{N}\sigma_n^4 - \frac{1}{N}\left(\sum_{n=1}^{N}\sigma_n^2\right)^2\right]$, which exceeds zero. In contrast, when all of the variances are the same, $E(\hat{\sigma}_t^2\pi_t^2) = 0$, so there is no bias.[9] Specifically, $\pi_{it} \sim \; iid \; N(0,|\sigma_i^2|)$, where $\sigma_i^2 \sim N(0,1)$.[10]

Table 1 reports the one percent, five percent, and ten percent critical values of the t-statistics for α_1 and α_2 resulting from 10,000 simulations. The empirical critical values are larger than their standard counterparts, despite the absence of an underlying economic link in

[9] Note that the bias arises here when N, the cross-section, is small, regardless of T, the length of the time series.

the artificial data. Indeed, the simulated critical values exceed the standard critical values by more than 60 percent in all cases. This highlights the possibility that some of the links reported in this empirical literature might be explained as purely small sample phenomena.

As noted above, Hartman (1991) discusses a related pitfall in estimating the relationships among the moments of price distributions in the context of a particular model of price changes. Similarly, Bryan and Cecchetti (1999) show that a small sample bias exists whenever the distribution of price changes is skewed. Our results build on theirs by showing that a relationship will emerge even in an extremely naïve model without skewness. Nevertheless, in our study, we find links in both goods and services markets and equity markets that are strong enough that they cannot be attributed simply to this bias.

4. Estimation Results

Table 2 summarizes the results of the estimation of Equations 1 and 2 using the actual data. The reported standard errors are calculated using the Newey and West (1987) correction for heteroskedasticity and autocorrelation. The significance levels, indicated with asterisks, reflect the small sample critical values of our Monte Carlo simulations, as reported in Table 1. The estimates for the stock markets are given in the first two columns of the table; and, the estimates for the goods and services markets are given in the last three columns.

As shown in the first row, the point estimates of α_1, the coefficient on positive inflation, range from about 0.09 to about 0.24. These estimates are statistically significant at the one percent or five percent level in all of the markets except the market for goods and services in New York City. Comparing the equity market point estimates with those of the

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[10] The results change little as we increase the variance of the distribution from which we draw σ_i^2.

goods and services markets, we see that the estimated value of α_1 in the NYSE is similar in magnitude to the estimate for the United States as a whole; and the NASDAQ estimate is roughly comparable to the estimates for the individual cities, New York and Houston. Of course, the t-statistic for the full U.S. panel is notably larger than the others.

The only clear difference between the two sets of markets emerges in the estimates of the coefficient on negative inflation, α_2, shown in the next row. In both equity markets, the estimated coefficient is small and statistically insignificant; while the estimates in the goods and services markets are sizable and significant at standard confidence levels.

As shown in the next two rows, we can strongly reject in both sets of markets the hypothesis that the coefficients on positive and negative inflation precisely offset each other, a hypothesis that is implicit in the empirical studies that use only the absolute value of π_t as a regressor. The strong rejection of this hypothesis also suggests that it may be similarly inappropriate to include only the square of π_t as a regressor. The table's next two rows show that in both sets of markets, we also strongly reject the joint hypothesis that the two coefficients equal zero.

So far, our measures of π_t have weighed all included prices equally. Since neither investment holdings nor consumer baskets are comprised of equal quantities all included items, we now also examine weighted versions of π_t. We utilize value-weighted measures for equities and consumption-weighted measures for goods and services. In the equity markets, π_t is defined using the value-weighted indices of the NYSE and NASDAQ. In the goods and services markets, the weights are constructed by normalizing the weights in the U.S. Consumer Price Index (CPI), which are provided in Table A7.[11]

We now re-estimate equations 1 and 2 using these weighted measures. Table 3 reports the results. Again, the reported standard errors are calculated using the Newey and West (1987) correction for heteroskedasticity and serial correlation, and the indicated significance levels reflect the small sample statistics of Table 1.

The range of estimates of α_1 is just slightly wider than earlier, and the t-statistics are overall (though not uniformly) slightly smaller. The estimates now range from about 0.08 to 0.29, compared with the earlier range of 0.09 to 0.24. These estimates are statistically significant at the one percent, five percent, or (now) ten percent levels in both equity markets and goods and services markets, except New York.

Comparing the point estimates in the equity markets with those of the goods and services markets, we see that once again the estimated value of α_1 in the NYSE is similar in magnitude to the estimate for the United States as a whole, and the NASDAQ estimate is roughly comparable to the Houston estimate. The NASDAQ estimate differs from the New York estimate, but the New York estimate remains statistically insignificant at any standard confidence level.

As before, the estimates of a_2 are insignificant in the equity markets, while they again are negative and strongly significant in the goods and services markets of New York and Houston. However, a_2 is no longer statistically significant in the U.S. panel. Once again,

[11] Specifically, we now let $\pi_t = \frac{1}{N}\sum_{n=1}^{N} w_n \pi_{nt}$, where $\frac{1}{N}\sum_{n=1}^{N} w_n = 1$.

both in equity markets and in goods and services markets we can reject the hypothesis that the coefficients on positive and negative inflation offset each other, though the rejection is weaker now for the U.S. panel and for Houston. Finally, we continue to strongly reject in both markets the joint hypothesis that both coefficients equal zero.

Next, we examine the link between inflation dispersion at longer time horizons. Both the new-Keynesian approach and the imperfect information approach seem to suggest that the strength of the link should diminish at longer horizons. Impulse response evidence presented in Parsley (1996) indeed suggests that initial increases in dispersion are quickly diminished. However, an alternative way to address this issue is to ask whether longer term inflation impacts dispersion. Table 4 reports the results using a one-year horizon, and Table 5 reports the results at a two-year horizon. We do not extend the horizon any further because the number of usable observations diminishes too much.[12]

As shown in Table 4, the one-year results are very similar to the one-quarter results, which were given in Table 2. Here, a_1 remains statistically significant at the one percent, five percent or ten percent level for both of the equity markets and is significant for the New York and Houston goods and services markets. Again, the only notable difference across the sets of markets occurs in the estimates of a_2, which are not significant in the equity markets but which are significant in the markets for goods and services. At the one-year horizon however, there are fewer negative observations of π_t, so the tests of whether a_1 and a_2 offset each other has low power, and we fail to reject that hypothesis. Nevertheless, the joint hypothesis that both coefficients equal zero continues to be strongly rejected.

[12] Debelle and Lamont (1997) examine goods prices at 5-year and 10-year horizons, and find that the link persists even at those long horizons.

Table 5 reports the results using a two-year horizon. The results are very similar to those in Table 4. Again, a_1 is significant at the one percent, five percent, or ten percent level for both equity markets and for both the New York and Houston goods and services markets; and again the estimate is insignificant for the larger U.S. goods and services panel. As for a_2, it remains insignificant in the NYSE and significant for Houston and for the U.S. as a whole. However, there are too few negative observations of π_t to estimate a_2 for the NASDAQ or for the New York goods and services market. The lack of negative observations in those two markets also precludes us from testing both the hypothesis that a_1 and a_2 offset each other and the joint hypothesis that they both equal zero. The small number of negative observations in the NYSE also reduces the power of the tests of these hypotheses in that market. In the remaining markets, we still strongly reject the both hypotheses.

Overall, our estimates indicate that links between $\hat{s}_t^2$ and π_t exist in both equity and goods and services markets. The similarities across the two sets of markets are particularly strong at quarterly horizons, but exist at longer horizons as well. For those differences that do arise, we note that they emerge primarily where the data are sparsest – where π_t is negative. For positive values of π_t and for hypotheses concerning the relevance of both positive and negative π_t, the results are comparable across the two sets of markets.

5. Conclusions

Our empirical results show that the link between overall price increases and relative price dispersion is not restricted to the markets for goods and services: it arises in equity markets as well. In addition, our Monte Carlo results illustrate that small sample biases are substantial. Hence, the use of standard critical values common to studies in this literature is not appropriate.

The two approaches most often used to explain the link in goods markets are the imperfect information approach and the new-Keynesian approach. Neither of these approaches offers a compelling explanation of the corresponding link we find in equity markets. Certainly, it does remain possible that either the imperfect information approach or the new-Keynesian approach may provide the appropriate explanation of the goods market finding; while, another, altogether different mechanism is at work in the equity markets. However, our results suggest to us that it would be worthwhile to renew the exploration of alternative approaches for explaining even the goods and services results. Such approaches may include a greater emphasis on the links between financial and non-financial variables.[13]

For decades the observed link between inflation and relative price variability has provided an apparent challenge to the classical dichotomy between nominal and real variables. Our work has highlighted the fact that the link is not yet clearly understood. Further research on the link as it arises in financial markets may prove fruitful, not only in explaining the puzzle raised by our own empirical findings, but in the broader context of monetary neutrality as well.

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[13] Alternatively, they may rely on multi-sector models, such as those of Balke and Wynne (2000), who emphasize the role played by correlated technology shocks in a multi-sector model in generating a link between inflation and relative prices. Balke and Wynne mainly explore the link between inflation and skewness. However, they also discuss the inflation-dispersion link.

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TABLE 1

SIMULATED CRITICAL VALUES

$$\hat{s}_t^2 = a_0 + a_1 p_t^+ + a_2 p_t^- + u_t$$

	t-statistic
α_1	
1 percent	4.12
5 percent	3.17
10 percent	2.71
α_2	
1 percent	-4.17
5 percent	-3.21
10 percent	-2.74
Number of Observations	100
Number of Cross-Sections	50
Number of Trials	10,000

For each simulation (trial), 50 vectors of independent, mean zero, normal pseudo-inflation realizations (π_i) were drawn of length 100, $\pi_i \sim N(0, |\sigma_i^2|)$, where $s_i^2 \sim N(0,1)$ and i = 1,50. For each of the 100 'time' periods, the cross-sectional mean and variance were computed (across the 50 vectors) and a regression was run corresponding to $\hat{\sigma}_t^2 = \alpha_0 + \alpha_1 \pi_t^+ + \alpha_2 \pi_t^- + u_t$. The empirical t-statistics for α_1 and α_2 were saved and sorted. The table records the 1%, 5% and 10% values from the resulting sorted vector of t-statistics.

TABLE 2
MEAN AGGREGATE PRICE CHANGES AND DISPERSION

	Equities		Goods and Services		
	NYSE (a)	NASDAQ (b)	New York (c)	U.S. (d)	Houston (e)
Estimate of a_1	0.092***	0.210**	0.238	0.099***	0.204**
Standard Error	(0.018)	(0.059)	(0.097)	(0.010)	(0.056)
t-statistic	5.111	3.559	2.454	9.900	3.642
Estimate of a_2	-0.020	-0.051	-0.298***	-0.166***	-0.242***
Standard Error	(0.016)	(0.032)	(0.069)	(0.019)	(0.050)
t-statistic	-1.250	-1.594	-4.319	-8.737	-4.840
$H_0 : a_1 + a_2 = 0$	20.39	24.24	15.80	118.53	26.62
Significance level	0.000	0.000	0.000	0.000	0.000
$H_0 : a_1 = a_2 = 0$	31.46	29.55	20.03	125.6	28.39
Significance level	0.000	0.000	0.000	0.000	0.000
Adjusted R^2	0.23	0.43	0.20	0.51	0.18
Number of Observations	100	100	68	3662	92

Notes:

1. Columns (a), (b), (c), and (e) report the results from estimating equation 1: $\hat{s}_t^2 = a_0 + a_1 p_t^+ + a_2 p_t^- + u_t$. Column (d) reports the results from estimating equation 2: $\hat{s}_t^2 = a_c' d_c + a_t' d_t + a_1 p_t^+ + a_2 p_t^- + u_t$.
2. Heteroskedasticity and serial correlation consistent standard errors and corresponding t-statistics are reported.
3. Single, double, and triple asterisks denote coefficient that are significant at the 10 percent, 5 percent and 1 percent significance level, as indicated by the simulations in Table 1.
4. Data are observed quarterly from 1975 though 1999.

TABLE 3
WEIGHTED AGGREGATE PRICE CHANGES AND DISPERSION

	Equities		Goods and Services		
	NYSE (a)	NASDAQ (b)	New York (c)	U.S. (d)	Houston (e)
Estimate of a_1	0.082**	0.116**	0.293	0.080***	0.189*
Standard Error	(0.020)	(0.043)	(0.115)	(0.011)	(0.063)
t-statistic	4.100	2.698	2.548	7.273	3.000
Estimate of a_2	-0.023	0.004	-1.822***	-0.172	-2.399***
Standard Error	(0.016)	(0.019)	(0.370)	(0.115)	(1.235)
t-statistic	-1.438	0.211	-4.919	-1.496	-1.943
$H_0 : a_1 + a_2 = 0$	16.90	13.34	21.62	4.71	4.367
Significance level	0.000	0.000	0.000	0.030	0.037
$H_0 : a_1 = a_2 = 0$	21.02	15.32	25.25	55.95	12.41
Significance level	0.000	0.001	0.000	0.000	0.002
Adjusted R^2	0.19	0.18	0.12	0.47	0.13
Number of Observations	100	100	68	3660	92

Notes:

1. Columns (a), (b), (c), and (e) report the results from estimating equation 1: $\hat{s}_t^2 = a_0 + a_1 p_t^+ + a_2 p_t^- + u_t$. Column (d) reports the results from estimating equation 2: $\hat{s}_t^2 = a_c' d_c + a_t' d_t + a_1 p_t^+ + a_2 p_t^- + u_t$.
2. Heteroskedasticity and serial correlation consistent standard errors and corresponding t-statistics are reported.
3. Single, double, and triple asterisks denote coefficient that are significant at the 10 percent, 5 percent and 1 percent significance level, as indicated by the simulations in Table 1.
4. Data are observed quarterly from 1975 though 1999.

TABLE 4
AGGREGATE PRICE CHANGES AND DISPERSION: 1-YEAR HORIZON

	Equities		Goods and Services		
	NYSE (a)	NASDAQ (b)	New York (c)	U.S. (d)	Houston (e)
Estimate of a_1	0.079***	0.265**	0.322***	0.055	0.402*
Standard Error	(0.011)	(0.072)	(0.045)	(0.021)	(0.149)
t-statistic	7.27	3.657	7.106	2.669	2.703
Estimate of a_2	-0.068	-0.142	-0.661***	-0.191***	-0.526*
Standard Error	(0.083)	(0.073)	(0.118)	(0.023)	(0.163)
t-statistic	-0.826	-1.954	-5.617	-8.364	-3.225
$H_0: a_1 + a_2 = 0$	0.196	2.24	13.17	46.80	0.652
Significance level	0.889	0.134	0.003	0.000	0.419
$H_0: a_1 = a_2 = 0$	57.06	13.86	51.81	77.51	11.81
Significance level	0.000	0.001	0.000	0.000	0.003
Adjusted R^2	0.16	0.38	0.33	0.82	0.33
Number of Observations	96	96	57	3321	85

Notes:
1. Columns (a), (b), (c), and (e) report the results from estimating equation 1: $\hat{s}_t^2 = a_0 + a_1 p_t^+ + a_2 p_t^- + u_t$. Column (d) reports the results from estimating equation 2: $\hat{s}_t^2 = a_c' d_c + a_t' d_t + a_1 p_t^+ + a_2 p_t^- + u_t$.
2. Heteroskedasticity and serial correlation consistent standard errors and corresponding t-statistics are reported.
3. Single, double, and triple asterisks denote coefficient that are significant at the 10 percent, 5 percent and 1 percent significance level, as indicated by the simulations in Table 1.
4. Data are observed quarterly from 1975 though 1999; holding periods are one year.

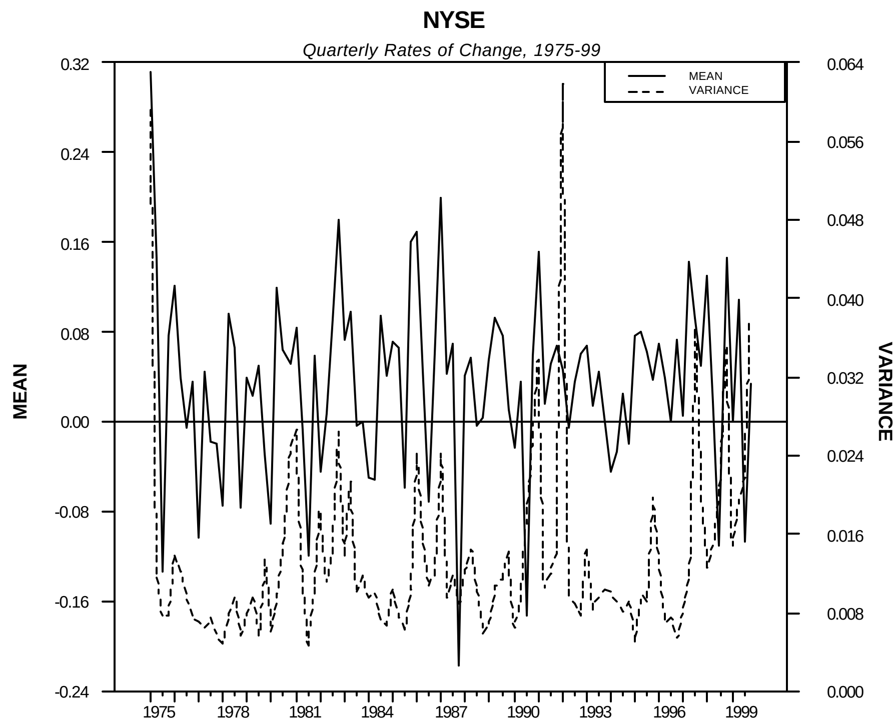
TABLE 5
AGGREGATE PRICE CHANGES AND DISPERSION: 2-YEAR HORIZON

	Equities		Goods and Services		
	NYSE (a)	NASDAQ (b)	New York (c)	U.S. (d)	Houston (e)
Estimate of a_1	0.080**	0.357*	0.256***	0.003	0.289***
Standard Error	(0.020)	(0.147)	(0.056)	(0.015)	(0.067)
t-statistic	3.92	2.419	4.608	0.221	4.328
Estimate of a_2	0.080	--	--	-0.215***	-0.444***
Standard Error	(0.102)	--	--	0.032	0.097
t-statistic	0.996	--	--	-6.670	-4.593
$H_0 : a_1 + a_2 = 0$	3.66	--	--	48.10	9.72
Significance level	0.056	--	--	0. 000	0.002
$H_0 : a_1 = a_2 = 0$	24.77	--	--	49.20	21.48
Significance level	0.000	--	--	0.000	0.000
Adjusted R^2	0.11	0.24	0.32	0.83	0.49
Number of Observations	92	92	46	2987	77

Notes:

1. Columns (a), (b), (c), and (e) report the results from estimating equation 1: $\hat{s}_t^2 = a_0 + a_1 p_t^+ + a_2 p_t^- + u_t$. Column (d) reports the results from estimating equation 2: $\hat{s}_t^2 = a_c' d_c + a_t' d_t + a_1 p_t^+ + a_2 p_t^- + u_t$.
2. Heteroskedasticity and serial correlation consistent standard errors and corresponding t-statistics are reported.
3. Single, double, and triple asterisks denote coefficient that are significant at the 10 percent, 5 percent and 1 percent significance level, as indicated by the simulations in Table 1.
4. Data are observed quarterly from 1975 though 1999; holding periods are two years.

FIGURE 1: EQUITY PRICES



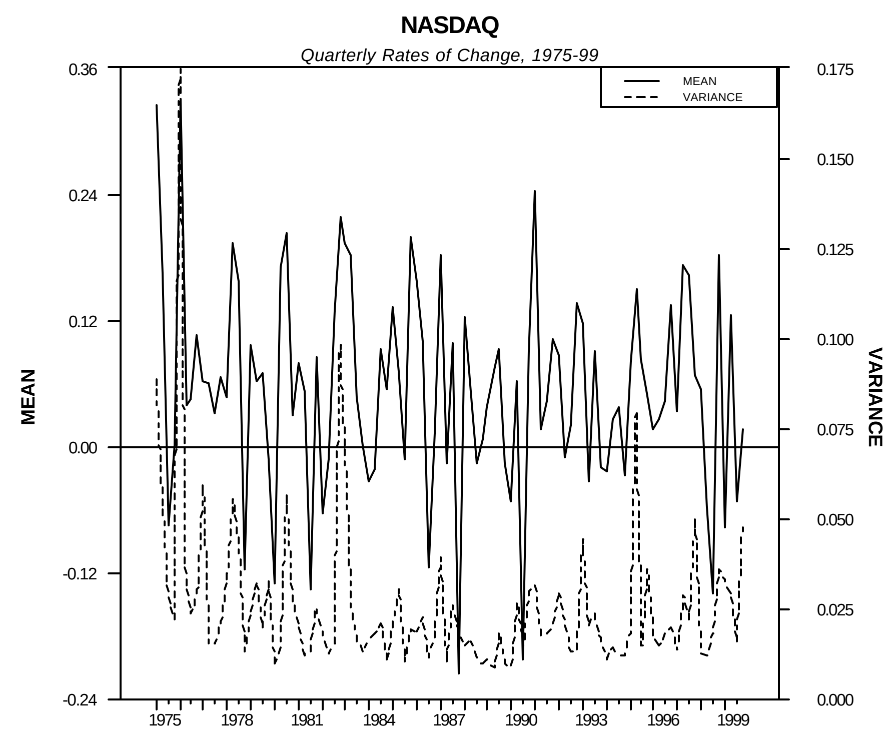
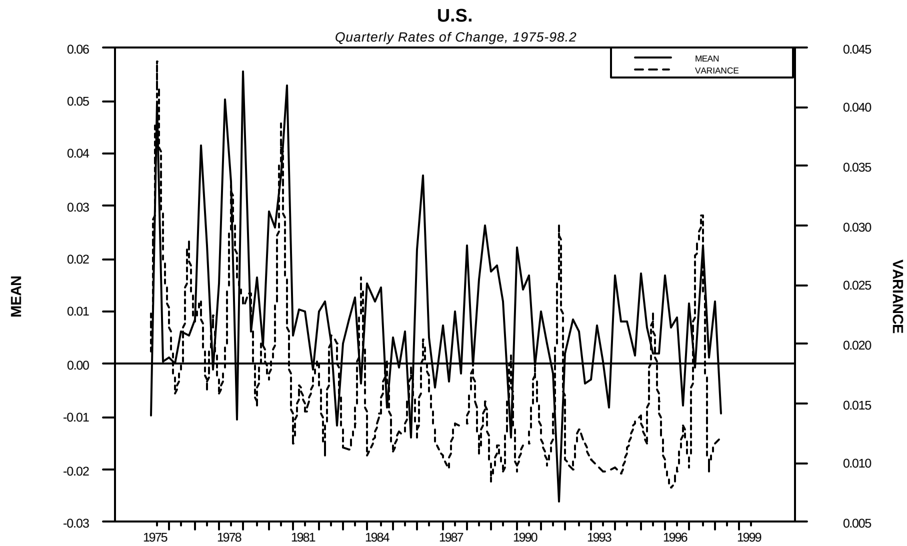
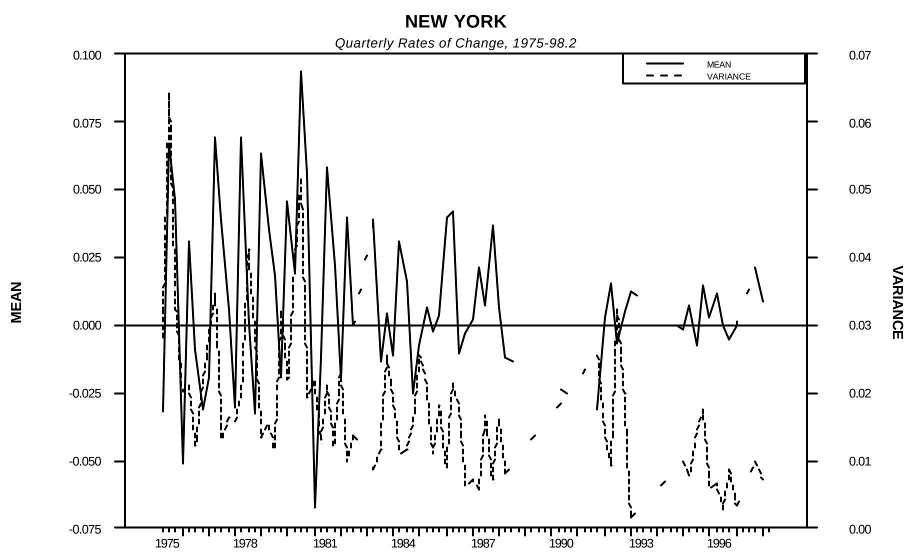


FIGURE 2: PRICES OF GOODS AND SERVICES





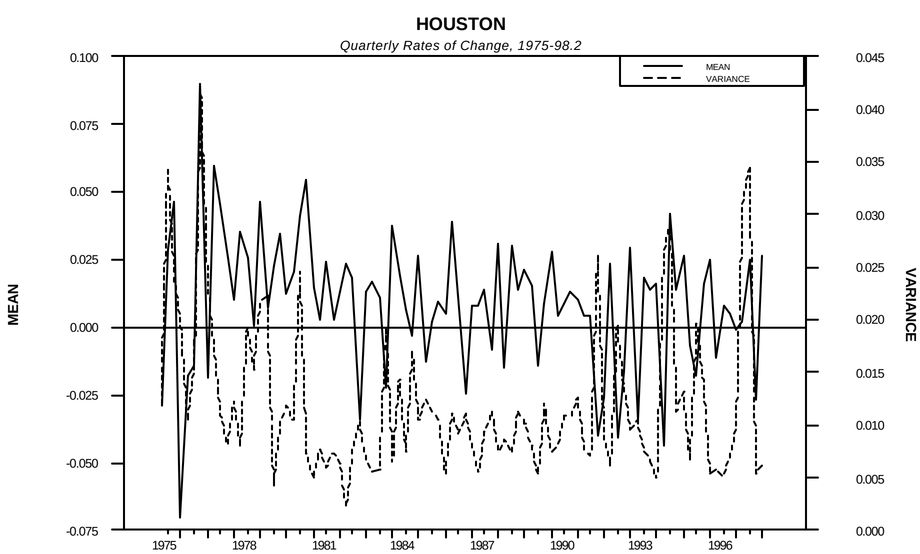
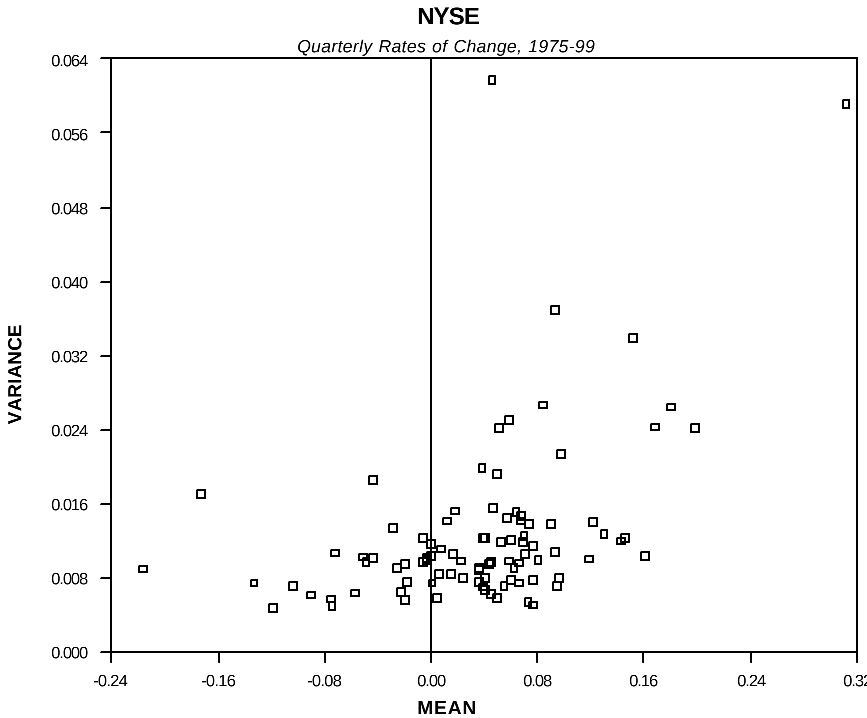


FIGURE 3: EQUITY PRICES



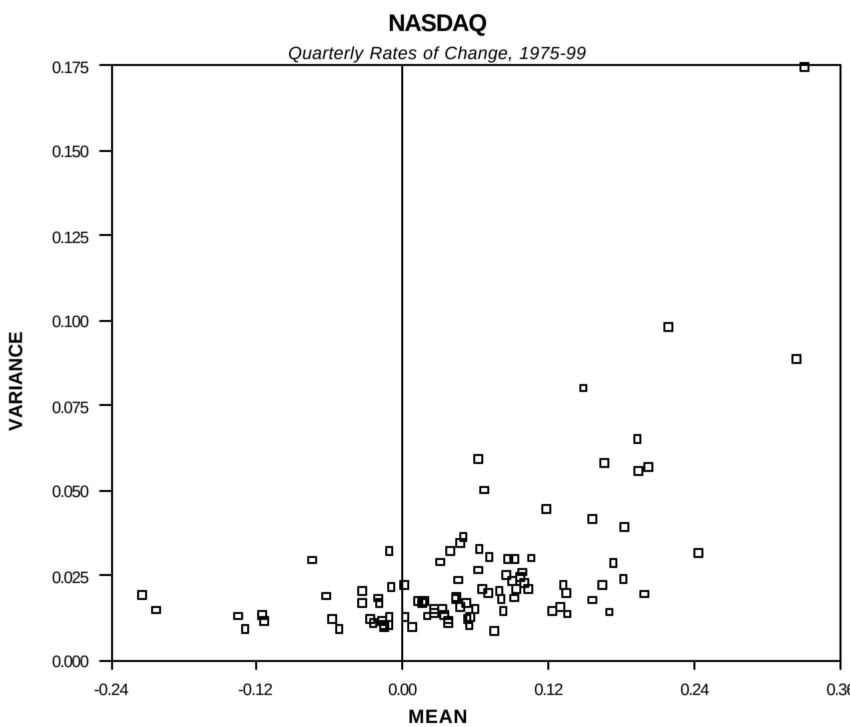
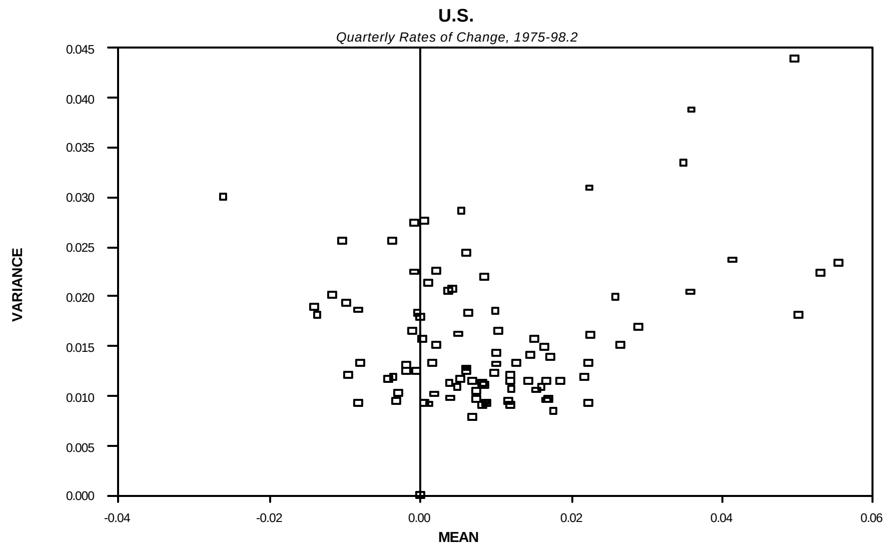
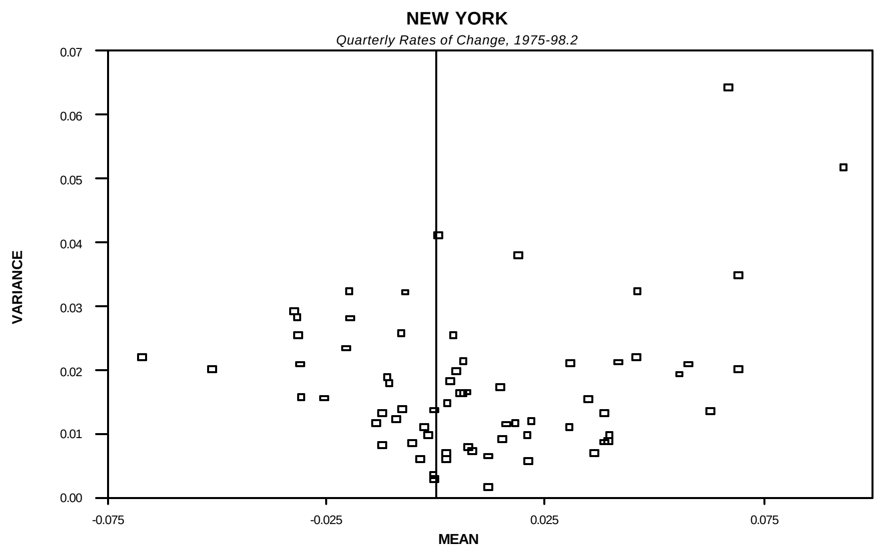
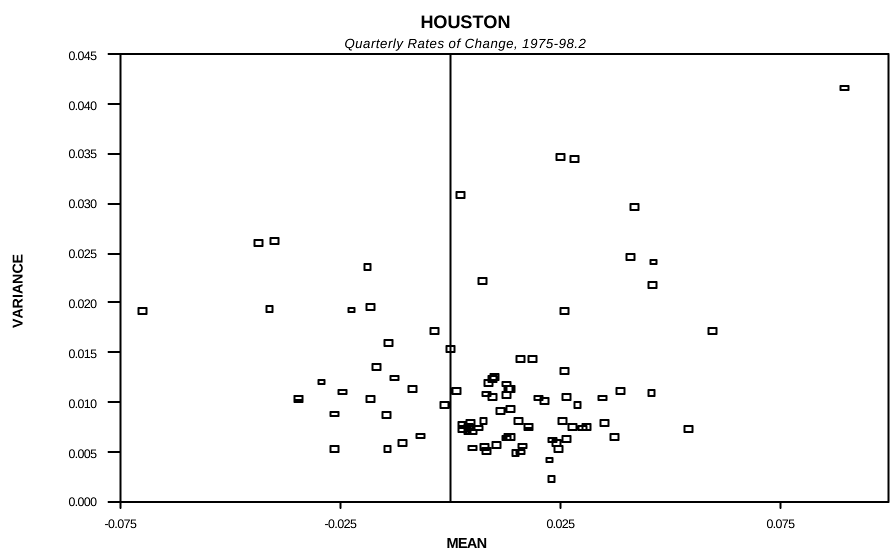


FIGURE 4: GOODS AND SERVICES PRICES







Appendix A1: Quarterly Rate of Change
NYSE Sample: 1975.1 – 1999.4

Series		Obs	Mean	StdError	Min	Max
1	A T & T CORP	100	0.0283	0.1090	-0.2206	0.3856
2	ARCHER DANIELS MIDLAND CO	100	0.0393	0.1542	-0.2838	0.5057
3	UNISYS CORP	100	0.0336	0.2725	-0.6226	1.3939
4	BESTFOODS	100	0.0388	0.1028	-0.2412	0.3605
5	COCA COLA CO	100	0.0476	0.1201	-0.3260	0.4906
6	DANA CORP	99	0.0341	0.1544	-0.3649	0.5234
7	EASTMAN KODAK CO	100	0.0184	0.1255	-0.2785	0.4672
8	INGERSOLL RAND CO	100	0.0269	0.1341	-0.2926	0.4260
9	K MART CORP	100	0.0183	0.1732	-0.5086	0.4511
10	MAYTAG CORP	100	0.0360	0.1594	-0.5228	0.4409
11	PHILLIPS PETROLEUM	100	0.0267	0.1197	-0.2377	0.5159
12	SEARS ROEBUCK & CO	100	0.0221	0.1439	-0.3542	0.3990
13	U S X MARATHON GROUP	100	0.0116	0.1472	-0.2862	0.5460
14	TEXAS INSTRUMENTS INC	100	0.0529	0.1938	-0.3552	0.6156
15	AMERICAN HOME PRODUCTS CORP	100	0.0277	0.1013	-0.2767	0.2750
16	PROCTER & GAMBLE CO	100	0.0362	0.1020	-0.2189	0.2860
17	MONSANTO COMPANY	100	0.0378	0.1288	-0.2519	0.3528
18	BRISTOL MYERS SQUIBB CO	100	0.0430	0.1046	-0.1757	0.3729
19	A M R CORP DEL	100	0.0534	0.2129	-0.3677	0.8049
20	RELIANT ENERGY INC	100	0.0158	0.0966	-0.2947	0.2945
21	CONSOLIDATED NATURAL GAS CO	100	0.0298	0.0969	-0.1489	0.3097
22	P P & L RESOURCES INC	100	0.0149	0.0898	-0.1690	0.3136
23	MERCK & CO INC	100	0.0431	0.1157	-0.2338	0.2796
24	MOTOROLA INC	100	0.0546	0.1782	-0.2880	0.6733
25	HEINZ H J CO	100	0.0382	0.0936	-0.1844	0.2278
26	ENRON CORP	100	0.0402	0.1200	-0.1995	0.4471
27	TEXTRON INC	100	0.0423	0.1453	-0.3296	0.6939
28	PUBLIC SERVICE ENTERPRISE GROUP	100	0.0192	0.0884	-0.1383	0.3152
29	HALLIBURTON COMPANY	100	0.0264	0.1647	-0.3674	0.4663
30	NORTHERN STATES POWER CO MN	100	0.0198	0.0899	-0.1661	0.3437
31	F P L GROUP INC	100	0.0210	0.0892	-0.1534	0.3468
32	ASHLAND INC	100	0.0274	0.1410	-0.3240	0.5144
33	KEYSPAN CORP	100	0.0197	0.1488	-0.3936	0.5625
34	TEXAS UTILITIES CO	100	0.0085	0.0820	-0.2064	0.1756
35	WHIRLPOOL CORP	100	0.0327	0.1501	-0.3299	0.5966
36	FORD MOTOR CO DEL	100	0.0459	0.1633	-0.2943	0.5171
37	DISNEY WALT CO	100	0.0587	0.1891	-0.2934	1.1287
38	P E CORP	100	0.0497	0.1820	-0.3094	0.6940
39	SPRINT CORP	100	0.0412	0.1189	-0.3218	0.3178
40	AVON PRODUCTS INC	100	0.0305	0.1734	-0.5529	0.5768
41	AUTOMATIC DATA PROCESSING INC	100	0.0570	0.1319	-0.1742	0.7767
42	GENUINE PARTS CO	100	0.0263	0.1051	-0.2411	0.4316
43	CHASE MANHATTAN CORP NEW	100	0.0421	0.1866	-0.4393	0.6464
44	GANNETT INC	100	0.0421	0.1223	-0.2463	0.4242
45	DUN & BRADSTREET CORP DEL	100	0.0350	0.1096	-0.1919	0.4481
46	UNION PACIFIC CORP	100	0.0279	0.1243	-0.3261	0.4125
47	LINCOLN NATIONAL CORP IN	100	0.0327	0.1127	-0.2820	0.2222
48	BURLINGTON NORTHERN SANTA FE CP	100	0.0420	0.1397	-0.2583	0.5015
49	GRAINGER W W INC	100	0.0378	0.1165	-0.2331	0.4245
50	ILLINOIS TOOL WORKS INC	100	0.0496	0.1226	-0.2979	0.3556
CRSP NYSE/AMEX VALUE WEIGHTED INDEX		100	0.0344	0.0811	-0.2382	0.2282
CRSP NYSE/AMEX EQUAL WEIGHTED INDEX		100	0.0689	0.1169	-0.2511	0.4829
CRSP S&P 500 COMPOSITE		100	0.0340	0.0769	-0.2323	0.2159

Appendix A2: Quarterly Rate of Change
NASDAQ Sample: 1975.1 – 1999.4

Series		Obs	Mean	Std Error	Min	Max
1	ALEXANDER & BALDWIN INC	100	0.0295	0.1332	-0.3176	0.5059
2	AMERICAN NATIONAL INS CO	100	0.0330	0.1502	-0.3070	0.8376
3	ANALOGIC CORP	99	0.0840	0.2488	-0.4337	1.2593
4	APPLIED MATERIALS INC	100	0.1211	0.2965	-0.3947	1.0263
5	POPULAR INC	100	0.0506	0.1422	-0.2069	0.5747
6	BERKLEY W R CORP	100	0.0526	0.1837	-0.2807	0.7143
7	BLOCK DRUG INC	99	0.0356	0.1369	-0.3636	0.5286
8	BOB EVANS FARMS INC	99	0.0523	0.1782	-0.3162	0.7794
9	COMPASS BANCSHARES INC	100	0.0410	0.1301	-0.2816	0.4254
10	CINCINNATI FINANCIAL CORP	100	0.0604	0.1585	-0.2798	0.7165
11	COMCAST CORP	100	0.0956	0.1821	-0.3056	0.6154
12	COMMERCE BANCSHARES INC	100	0.0385	0.1036	-0.2093	0.3279
13	COMMONWEALTH TELE ENTPRS INC	100	0.0538	0.1796	-0.4878	0.4500
14	ARTESYN TECHNOLOGIES INC	100	0.0805	0.2809	-0.4667	1.4737
15	COMPUTER HORIZONS CORP	100	0.1377	0.4587	-0.5892	2.4000
16	REGIONS FINANCIAL CORP	100	0.0369	0.1114	-0.2568	0.3239
17	TRUSTMARK CORP	99	0.0418	0.1330	-0.2934	0.4597
18	FIRST SECURITY CORP DE	100	0.0373	0.1472	-0.3226	0.4110
19	FULLER H B CO	100	0.0534	0.1745	-0.3731	0.5274
20	G & K SERVICES INC	100	0.0620	0.1369	-0.3411	0.3810
21	GENERAL BINDING CORP	100	0.0296	0.1808	-0.4198	0.4508
22	HELIX TECHNOLOGY CORP	95	0.0842	0.2861	-0.4384	1.1772
23	HUNTINGTON BANCSHARES INC	100	0.0445	0.1306	-0.3225	0.4607
24	KANSAS CITY LIFE INS CO	100	0.0323	0.1293	-0.2807	0.7143
25	KELLY SERVICES INC	100	0.0553	0.1654	-0.2847	0.4272
26	KULICKE & SOFFA INDS INC	100	0.1218	0.3849	-0.5978	1.4224
27	LANCASTER COLONY CORP	100	0.0632	0.1931	-0.2875	0.5714
28	LANCE INC	100	0.0261	0.1562	-0.2775	0.9899
29	MERCANTILE BANKSHARES CORP	100	0.0423	0.1169	-0.3182	0.3689
30	MILLER HERMAN INC	100	0.0711	0.1868	-0.3209	0.6124
31	MOLEX INC	100	0.0756	0.1769	-0.3288	0.8810
32	NATIONAL COMMERCE BANCORP	100	0.0587	0.1190	-0.2143	0.4400
33	NATIONAL COMPUTER SYSTEMS INC	100	0.0827	0.2195	-0.3378	0.7619
34	NORTHERN TRUST CORP	100	0.0489	0.1236	-0.3058	0.4048
35	NORTHWEST NATURAL GAS CO	99	0.0196	0.0861	-0.2275	0.2412
36	OHIO CASUALTY CORP	100	0.0284	0.1167	-0.2765	0.3333
37	INTEL CORP	100	0.0927	0.2337	-0.3253	1.3152
38	SAFECO CORP	100	0.0324	0.1336	-0.3654	0.4839
39	YELLOW CORP	100	0.0209	0.1859	-0.3298	0.5263
40	OTTER TAIL POWER CO	100	0.0179	0.0745	-0.1503	0.2330
41	PACCAR INC	100	0.0435	0.1407	-0.2783	0.3914
42	PRESIDENTIAL LIFE CORP	98	0.0950	0.2396	-0.5070	0.8194
43	RIGGS NATIONAL CORP WASH D C	100	0.0209	0.1732	-0.3674	0.7941
44	CORUS BANKSHARES INC	100	0.0608	0.1420	-0.2593	0.7113
45	SCHULMAN A INC	100	0.0554	0.1737	-0.3994	0.6062
46	SOUTHTRUST CORP	100	0.0462	0.1171	-0.2105	0.3796
47	TRUST CO N J JERSEY CITY NEW	67	0.0459	0.1456	-0.3000	0.4828
48	U M B FINANCIAL CORP	100	0.0351	0.0993	-0.2051	0.2584
49	WORTHINGTON INDUSTRIES INC	100	0.0567	0.1877	-0.3147	0.7319
50	ZIONS BANCORP	100	0.0592	0.1574	-0.4263	0.5283
NASDAQ COMPOSITE		100	0.0492	0.1137	-0.0024	0.0382

Appendix A3: U. S. Cities

1 Birmingham AL
2 Mobile AL
3 Blythe CA
4 Indio CA
5 Palm Springs CA
6 Denver CO
7 Lakeland FL
8 Boise ID
9 Champaign-Urbana IL
10 Peoria IL
11 Ft. Wayne IN
12 Indianapolis IN
13 Cedar Rapids IA
14 Lexington KY
15 Louisville KY
16 Baton Rouge LA
17 Lafayette LA
18 New Orleans LA
19 Benton Harbor MI
20 Traverse City MI
21 Columbus MS
22 St. Joseph MO
23 St. Louis MO
24 Falls City NE
25 Hastings NE
26 Omaha NE
27 Reno, Sparks NV
28 Newark NJ
29 New York NY
30 Hickory NC
31 Columbus OH
32 Altoona PA
33 Rapid City SD
34 Vermillion SD
35 Chattanooga TN
36 Knoxville TN
37 Abilene TX
38 EL Paso TX
39 Ft. Worth TX
40 Houston TX
41 Lubbock TX
42 Salt Lake City UT
43 Charleston WV
44 Appleton WI
45 Eau Claire WI
46 Madison WI
47 Oshkosh WI
48 Casper WY

Appendix A4: U.S. Goods and Services Price Inflation
Quarterly, 1975.1 – 1998.2

	Obs	Mean	Std Error	Minimum	Maximum
1 Tuna	2310	-0.00588	0.1053	-0.5316	0.5650
2 Cigarette	3696	0.00132	0.1582	-2.1484	0.3393
3 Coffee	3536	0.00985	0.1255	-0.7314	0.6159
4 Sugar	2840	0.00488	0.1118	-0.5511	0.7864
5 Cereal	2840	0.01810	0.1022	-0.4760	0.5143
6 Peas	3306	0.00045	0.1432	-1.1118	0.6190
7 Tomatoes	3585	-0.00288	0.1402	-1.4906	0.5877
8 Peaches	3624	0.00095	0.1379	-1.4560	0.4780
9 Facial tissues	3507	-0.01390	0.2090	-2.0388	0.8109
10 Dishwashing powder	3628	0.00137	0.1313	-1.0782	0.6255
11 Shortening	3696	0.00025	0.0809	-0.8357	0.4011
12 Orange juice	3621	-0.00529	0.2202	-2.2958	0.6286
13 Corn	2008	0.00943	0.1080	-0.6234	0.8649
14 Baby food	3684	0.00104	0.1120	-1.2927	0.6711
15 Soft drink	3603	-0.00905	0.1736	-1.3940	0.8266
16 Antibiotic ointment	2245	0.01652	0.0970	-0.6457	0.5853
17 Toothpaste	2311	0.00670	0.1028	-0.6742	0.5478
18 Shampoo	2311	-0.01108	0.1428	-1.0986	0.9246
19 Man’s dress shirt	2311	0.00962	0.1147	-0.5389	0.6161
20 Boy’s underwear	2311	0.00254	0.1297	-0.7626	0.8007
21 Man’s denim jeans	2311	0.00966	0.1080	-0.6412	1.1291
22 Tennis balls	2311	-0.00306	0.1047	-0.5836	0.7262
23 Child’s game	2311	0.00517	0.0974	-1.6979	0.6495
24 Liquor	3625	-0.00805	0.1399	-1.5449	0.3009
25 Beer	2310	0.00756	0.0615	-0.8777	0.4913
26 Wine	2310	0.00910	0.1216	-0.5488	0.7075
27 Steak	3605	-0.00202	0.1904	-1.8960	0.5050
28 Ground Beef	3696	0.00138	0.1475	-1.0368	0.7149
29 Sausage	3471	0.00142	0.1964	-1.4820	0.8856
30 Chicken	3694	0.00014	0.1613	-0.9996	0.6783
31 Milk	3696	0.00091	0.0938	-0.8955	0.3989
32 Eggs	3694	0.00100	0.1396	-0.9291	0.6438
33 Margarine	3691	-0.00048	0.1496	-0.7768	0.5937
34 Parmesan cheese	2308	0.00663	0.0722	-1.6248	1.4747
35 Potatoes	3694	0.00184	0.3429	-1.6213	1.4122
36 Bananas	3692	0.00114	0.2144	-1.4842	0.8960
37 Lettuce	3696	0.00096	0.3067	-1.4663	1.2595
38 Bread	3603	-0.00277	0.1883	-1.2308	0.9433
39 Hamburger	2310	0.00765	0.0813	-0.7394	0.7394
40 Pizza	2311	0.00837	0.0588	-0.5314	0.5314
41 Fried chicken	2311	0.00615	0.0868	-0.6931	0.6931
42 Auto maintenance	2838	-0.00361	0.1238	-1.1813	0.5796
43 Hospital room	3694	0.00160	0.2096	-3.6523	0.5969
44 Doctor	3690	0.00110	0.1932	-2.3918	0.5389
45 Dentist	3684	0.00060	0.1851	-1.9494	0.6931
46 Haircut	3690	0.00115	0.1451	-1.8028	0.6110
47 Beauty salon	2311	0.00711	0.1000	-0.6648	0.7528
48 Dry cleaning	3696	0.00155	0.1383	-1.6292	0.6061
49 Appliance repair	3604	0.00061	0.1413	-1.5354	0.5782
50 Movie	3692	0.00097	0.1233	-1.3862	0.9162
51 Bowling	3688	0.00079	0.1553	-2.2211	0.7793

Appendix A5: New York Goods and Services Price Inflation
Quarterly, 1975.1 – 1998.2

	Obs	Mean	Std Error	Minimum	Maximum
1 Tuna	39	0.0130	0.1326	-0.2905	0.3576
2 Cigarette	68	0.0099	0.0474	-0.1656	0.2061
3 Coffee	66	0.0067	0.1314	-0.3940	0.3935
4 Sugar	51	0.0126	0.1120	-0.1846	0.4134
5 Cereal	51	0.0269	0.0748	-0.0976	0.2876
6 Peas	59	0.0082	0.1363	-0.2776	0.4754
7 Tomatoes	65	0.0041	0.1468	-0.5221	0.5810
8 Peaches	66	0.0122	0.0991	-0.2567	0.3437
9 Facial tissues	64	0.0069	0.1082	-0.2318	0.3715
10 Dishwashing powder	68	0.0059	0.1000	-0.4628	0.2303
11 Shortening	68	0.0022	0.0670	-0.2006	0.2189
12 Orange juice	66	0.0215	0.1486	-0.3901	0.3964
13 Corn	34	0.0044	0.1755	-0.4082	0.7806
14 Baby food	68	0.0108	0.0593	-0.2478	0.2478
15 Soft drink	66	0.0044	0.1289	-0.3248	0.6061
16 Antibiotic ointment	39	0.0266	0.0985	-0.2519	0.2885
17 Toothpaste	39	0.0136	0.0807	-0.2099	0.1954
18 Shampoo	39	-0.0091	0.1368	-0.6906	0.1905
19 Man’s dress shirt	39	-0.0036	0.0960	-0.2124	0.2568
20 Boy’s underwear	39	0.0084	0.0646	-0.1811	0.1891
21 Man’s denim jeans	39	0.0094	0.0798	-0.2034	0.2392
22 Tennis balls	39	0.0056	0.0671	-0.1987	0.1522
23 Child’s game	39	0.0045	0.0585	-0.1195	0.1714
24 Liquor	68	0.0073	0.0478	-0.2078	0.2260
25 Beer	39	0.0011	0.0836	-0.1633	0.3504
26 Wine	39	0.0103	0.1248	-0.3940	0.4309
27 Steak	66	0.0140	0.1430	-0.4725	0.3851
28 Ground Beef	68	0.0157	0.1299	-0.3339	0.4659
29 Sausage	62	0.0147	0.1494	-0.3393	0.3998
30 Chicken	68	0.0066	0.1795	-0.4776	0.4729
31 Milk	68	0.0071	0.0417	-0.1726	0.1283
32 Eggs	68	0.0049	0.1192	-0.3983	0.3811
33 Margarine	68	0.0026	0.1695	-0.4139	0.5260
34 Parmesan cheese	39	0.0053	0.0281	-0.0531	0.0703
35 Potatoes	68	0.0020	0.3692	-0.7953	0.9808
36 Bananas	68	0.0068	0.2076	-0.7308	0.4399
37 Lettuce	68	0.0135	0.2527	-0.6268	0.4776
38 Bread	66	-0.0056	0.2156	-0.6435	0.5810
39 Hamburger	39	0.0030	0.1282	-0.5639	0.5047
40 Pizza	39	0.0061	0.0499	-0.2209	0.1007
41 Fried chicken	39	0.0055	0.0872	-0.3466	0.2297
42 Auto maintenance	51	-0.0113	0.1305	-0.7632	0.1355
43 Hospital room	68	0.0164	0.0654	-0.0970	0.4519
44 Doctor	68	0.0109	0.0870	-0.2809	0.3931
45 Dentist	68	0.0097	0.0771	-0.1541	0.3364
46 Haircut	68	0.0160	0.0732	-0.2768	0.2565
47 Beauty salon	39	-0.0042	0.1178	-0.2702	0.2893
48 Dry cleaning	68	0.0181	0.0593	-0.0870	0.2623
49 Appliance repair	66	0.0026	0.0507	-0.1426	0.1570
50 Movie	68	0.0067	0.0511	-0.2054	0.1402
51 Bowling	68	0.0196	0.0916	-0.4054	0.4242

Appendix A6: Houston Goods and Services Price Inflation
Quarterly, 1975.1 – 1998.2

	Obs	Mean	Std Error	Minimum	Maximum
1 Tuna	63	-0.0048	0.1211	-0.2791	0.3061
2 Cigarette	92	0.0161	0.0379	-0.1516	0.1290
3 Coffee	88	0.0127	0.1345	-0.3572	0.5938
4 Sugar	75	0.0028	0.0917	-0.3065	0.2933
5 Cereal	75	0.0166	0.0811	-0.2797	0.3442
6 Peas	83	0.0060	0.0764	-0.1880	0.1698
7 Tomatoes	89	0.0068	0.0790	-0.1419	0.2151
8 Peaches	90	0.0115	0.0586	-0.1236	0.2876
9 Facial tissues	88	0.0049	0.1032	-0.3254	0.5260
10 Dishwashing powder	90	0.0078	0.0751	-0.3019	0.1885
11 Shortening	92	0.0022	0.0667	-0.2212	0.2245
12 Orange juice	90	0.0140	0.0900	-0.2710	0.3227
13 Corn	56	0.0113	0.0911	-0.1708	0.4831
14 Baby food	92	0.0039	0.0797	-0.4054	0.2318
15 Soft drink	90	-0.0023	0.1944	-0.4883	0.5679
16 Antibiotic ointment	61	0.0204	0.0582	-0.1244	0.1374
17 Toothpaste	63	0.0060	0.0865	-0.1583	0.2188
18 Shampoo	63	-0.0122	0.1516	-0.8443	0.3760
19 Man’s dress shirt	63	0.0079	0.1130	-0.3078	0.4419
20 Boy’s underwear	63	0.0040	0.0878	-0.1840	0.2634
21 Man’s denim jeans	63	0.0045	0.0707	-0.1975	0.1873
22 Tennis balls	63	-0.0002	0.0859	-0.3027	0.2061
23 Child’s game	63	0.0081	0.0609	-0.1313	0.1373
24 Liquor	90	0.0049	0.0475	-0.2616	0.2024
25 Beer	63	0.0063	0.0633	-0.2722	0.2699
26 Wine	63	0.0094	0.1629	-0.4134	0.4467
27 Steak	90	0.0120	0.1022	-0.1849	0.2995
28 Ground Beef	92	0.0073	0.1272	-0.4117	0.3811
29 Sausage	86	0.0079	0.1223	-0.2395	0.3591
30 Chicken	92	0.0064	0.1177	-0.2451	0.3737
31 Milk	92	0.0064	0.0828	-0.2732	0.3844
32 Eggs	92	0.0043	0.1246	-0.3706	0.3053
33 Margarine	92	0.0015	0.1356	-0.4376	0.3991
34 Parmesan cheese	63	0.0052	0.0471	-0.1211	0.1122
35 Potatoes	92	0.0129	0.2363	-0.5757	0.7156
36 Bananas	92	0.0094	0.1562	-0.4284	0.4248
37 Lettuce	92	0.0147	0.2731	-0.7312	0.6828
38 Bread	90	0.0032	0.1520	-0.5533	0.5658
39 Hamburger	63	0.0073	0.0946	-0.5158	0.3998
40 Pizza	63	0.0072	0.0670	-0.2859	0.2555
41 Fried chicken	63	0.0112	0.0782	-0.2346	0.3376
42 Auto maintenance	75	-0.0035	0.0930	-0.6442	0.2490
43 Hospital room	92	0.0230	0.0778	-0.4871	0.5243
44 Doctor	92	0.0198	0.0739	-0.2089	0.2517
45 Dentist	92	0.0162	0.0910	-0.3506	0.3805
46 Haircut	92	0.0103	0.0489	-0.1812	0.2534
47 Beauty salon	63	0.0031	0.0939	-0.3853	0.4611
48 Dry cleaning	92	0.0080	0.0510	-0.1967	0.2476
49 Appliance repair	90	0.0120	0.0591	-0.1488	0.2700
50 Movie	92	0.0083	0.0591	-0.2640	0.2742
51 Bowling	92	0.0133	0.0611	-0.2632	0.2158

Appendix A7: Normalized Consumer Price Index Weights

1 Tuna	0.004131
2 Cigarette	0.089324
3 Coffee	0.010783
4 Sugar	0.018455
5 Cereal	0.015451
6 Peas	0.004775
7 Tomatoes	0.003541
8 Peaches	0.004185
9 Facial tissues	0.006491
10 Dishwashing powder	0.022371
11 Shortening	0.013948
12 Orange juice	0.015236
13 Corn	0.004775
14 Baby food	0.015719
15 Soft drink	0.021084
16 Antibiotic ointment	0.021084
17 Toothpaste	0.006491
18 Shampoo	0.006491
19 Man’s dress shirt	0.016363
20 Boy’s underwear	0.014700
21 Man’s denim jeans	0.013036
22 Tennis balls	0.013197
23 Child’s game	0.006760
24 Liquor	0.012071
25 Beer	0.024517
26 Wine	0.010676
27 Steak	0.004185
28 Ground Beef	0.019850
29 Sausage	0.011105
30 Chicken	0.007564
31 Milk	0.013573
32 Eggs	0.009603
33 Margarine	0.005472
34 Parmesan cheese	0.014485
35 Potatoes	0.004667
36 Bananas	0.003541
37 Lettuce	0.003755
38 Bread	0.012285
39 Hamburger	0.038519
40 Pizza	0.038519
41 Fried chicken	0.038519
42 Auto maintenance	0.081545
43 Hospital room	0.040933
44 Doctor	0.092758
45 Dentist	0.052253
46 Haircut	0.006009
47 Beauty salon	0.023766
48 Dry cleaning	0.015773
49 Appliance repair	0.009388
50 Movie	0.036642
51 Bowling	0.019635