

THE IMPACT OF MARKET-ORIENTED REFORMS ON STOCK PRICE MOVEMENTS: SECTOR-BASED EVIDENCE FROM UZBEKISTAN

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Abstract

The study investigated whether market-oriented reforms in Uzbekistan were reflected in the behaviour of stock prices across economic sectors. The author used firm-level data on 85 companies listed on the Uzbek Stock Exchange for 2024, grouped them by industry and classified annual price movements as rises, falls or no change. A chi-square test of independence assessed sectoral differences in performance, and the analysis was carried out in Python. The results showed that price movements were distributed unevenly across sectors, which pointed to differentiated market responses linked to varying degrees of state participation and reform exposure. The conclusion set out the value of stock market indicators for assessing reform effectiveness and outlined the further data that would strengthen such assessment.

Keywords: chi-square analysis, Python, stock market reforms, privatisation, sectoral analysis, Uzbek Stock Exchange, stock price movements, transition economy, policy effectiveness.

Annotatsiya

Tadqiqotda O'zbekistondagi bozor yo'nalishidagi islohotlar aksiya narxlari harakatida qay darajada aks etganini tarmoqlar kesimida o'rganildi. O'zbekiston Respublika fond birjasida 2024-yilda kotirovka qilingan 85 ta kompaniya bo'yicha firma darajasidagi ma'lumotlardan foydalandi, ularni tarmoqlar bo'yicha guruhlagi va yillik narx o'zgarishini o'sish, pasayish hamda o'zgarishsiz holat toifalariga ajratildi. Tarmoqlararo farqni baholash uchun xi-kvadrat mustaqillik mezoni qo'llanildi, hisob-kitoblar Python muhitida bajarildi. Natijalar narx harakati tarmoqlar bo'yicha bir tekis taqsimlanmaganini ko'rsatdi va bu davlat ishtiroki hamda islohot ta'siri darajasiga bog'liq tabaqalashgan bozor javobiga ishora qildi. Xulosada fond bozori ko'rsatkichlarining islohot samaradorligini baholashdagi imkoniyatlari bayon etildi.

Kalit so'zlar: xi-kvadrat tahlili, Python, fond bozori islohotlari, xususiylashtirish, tarmoq tahlili, O'zbekiston fond birjasi, aksiya narxlari harakati, o'tish iqtisodiyoti, siyosat samaradorligi.

Аннотация

Исследование изучило, в какой мере рыночные реформы в Узбекистане отразились в динамике цен акций в разрезе отраслей. Автор использовал данные по 85 компаниям, котируемым на Узбекской республиканской фондовой бирже в 2024 году, сгруппировал их по отраслям и классифицировал годовое изменение цен как рост, снижение или отсутствие изменений. Для оценки межотраслевых различий применялся критерий независимости хи-квадрат, расчёты выполнялись в среде Python. Результаты показали, что движение цен распределялось по отраслям неравномерно, что указывало на дифференцированную реакцию рынка, связанную с различной степенью государственного участия и

подверженности реформам. В заключении раскрыты возможности рыночных индикаторов для оценки результативности реформ.

Ключевые слова: хи-квадрат анализ, Python, реформы фондового рынка, приватизация, отраслевой анализ, Узбекская фондовая биржа, движение цен акций, переходная экономика, результативность политики.

INTRODUCTION

Over the past decade Uzbekistan has carried out a broad programme of market-oriented reforms designed to strengthen the role of capital markets in economic development. Large-scale privatisation, the progressive liberalisation of foreign direct investment and measures to improve corporate governance and market transparency have advanced together. The national development agenda reinforces this direction, placing the growth of a competitive private sector, the expansion of investment activity and the modernisation of institutional governance among its central objectives for the period to 2030 [1]. These reforms deepen financial markets, improve allocative efficiency and widen access to capital for enterprises across the economy.

A well-functioning stock market transmits policy signals to the real economy by reflecting investor expectations about firm performance and growth prospects. Sectoral price movements are particularly informative, because they reveal how different parts of the economy absorb reform measures in settings where state participation remains unevenly distributed across industries. In markets that are still building depth and trading volume, the degree to which prices incorporate policy information is an empirical question worth measuring directly. Trading records published by the exchange make such measurement feasible at the firm level [2].

The study examines whether stock price behaviour on the Uzbek Stock Exchange in 2024 differed systematically across economic sectors. Firm-level price movements are classified into rises, falls and no-change outcomes, and a chi-square test of independence provides an assessment of sectoral heterogeneity in market responses. The aim is to identify descriptive patterns consistent with differential exposure to ongoing reforms, and the findings are presented as evidence of association rather than as causal claims.

The contribution of the work lies in offering sector-level evidence from an equity market that has so far received limited empirical attention, and in clarifying how stock market indicators can be used to evaluate reform effectiveness in transition economies. The results are intended to support future research that combines financial market data with more direct measures of policy exposure and real economic performance.

LITERATURE REVIEW

The literature on the financial-market effects of privatisation and liberalisation in transition and emerging economies is extensive and multi-disciplinary. One central strand asks whether privatisation and market opening stimulate stock-market development and whether prices register reform signals. Perotti and van Oijen showed that a sustained privatisation programme functions as a major political test that gradually resolves uncertainty about commitment to market-oriented policy, and that

progress in privatisation correlates with improvements in perceived political risk, thereby supporting stock-market activity [3]. Cross-country evidence on share-issue privatisations confirms the channel from the liquidity side: privatisation events are associated with higher turnover and deeper trading on domestic exchanges [4].

A closely related strand concerns stock-market liberalisation. Event-study evidence demonstrates that liberalisation episodes, which typically widen access for foreign investors, are accompanied by abnormal returns around announcement dates, a pattern consistent with lower risk premia and improved valuation once markets open to international capital [5]. Findings of this kind establish price signals as early indicators of the expected benefits of policy action.

The translation of asset-price signals into real-economy outcomes depends on implementation quality. Analyses of the macroeconomic effects of privatisation emphasise that receipts, listing activity and market opening deliver durable gains when they are accompanied by fiscal discipline and institutional strengthening [6]. Comparative work on the governance of stock markets in transition settings reaches a similar conclusion, showing that the regulatory and enforcement framework determines how effectively market signals are produced and used [7]. Reviews of privatisation experience add that reforms in competitive sectors, and those combined with regulatory change, produce stronger efficiency gains and clearer market responses [8], [9].

Sectoral heterogeneity is a recurring theme. Markets respond differently across industries according to ownership structure, exposure to trade and foreign investment, and the pace of regulatory change. Banking and utility sectors, where state participation is typically higher, display more idiosyncratic price behaviour than competitive manufacturing or export-oriented activities, so industry classification serves as a useful yet approximate proxy for policy exposure [7], [8].

The methodological literature offers guidance for empirical work in markets that are still gaining depth. Studies of share-issue privatisations show that event-study and cross-sectional approaches benefit from explicit treatment of thin trading and of the timing of privatisation decisions [4], [10]. Researchers working on emerging markets therefore combine descriptive association measures, such as contingency tables and chi-square statistics, with econometric models conditioned on firm-level observables including size, liquidity and ownership share, which allows a stepwise move from description to stronger inference [3].

For Uzbekistan the academic and policy literature is growing. Comparative regional studies document the structural tasks involved in building equity markets in transition economies and describe the institutional groundwork required [11]. Country-level research records the expansion of listing and issuance activity and the policy initiatives aimed at attracting investment and modernising corporate governance, and identifies clear prospects for further market development [12]. These developments make Uzbekistan a timely case for exploratory sectoral analysis, since observing whether price reactions cluster by industry yields early evidence on how market participants read reform signals.

Careful interpretation remains essential. Price reactions may reflect liquidity conditions or sentiment alongside fundamentals, and modest sample sizes call for effect-size reporting, sensitivity checks under alternative discretisations, and triangulation with firm-level outcomes such as investment and employment together with direct measures of policy exposure [4], [6].

METHODOLOGY

The study adopts a quantitative, cross-sectional design to examine whether stock price movements differ systematically across economic sectors on the Uzbek Stock Exchange. Given the exploratory aim and the structural characteristics of a market that is still building trading depth, the analysis identifies associations rather than causal effects, using categorical methods to assess sectoral heterogeneity during 2024, a year of active market-oriented reform.

The dataset is drawn from the trading records of the Tashkent Republican Stock Exchange and covers 85 listed companies for 2024 [2]. Firm-level price data are used to compute annual price changes, which form the primary outcome variable. Companies are assigned to economic sectors according to their principal line of business, following standard industry classification logic. Duplicate listings and firms with incomplete price information are excluded so that the sample remains internally consistent.

The dependent variable is the direction of the annual price change, discretised into three mutually exclusive categories: price rise, price fall and no change. This classification captures directional market responses rather than the magnitude of returns, limits the influence of extreme values and suits non-parametric testing in compact samples. The explanatory variable is the industry sector, treated as categorical. Sectoral classification also serves as an indirect proxy for differences in ownership structure and exposure to reform policy, given the uneven distribution of state participation across industries. The proxy is approximate, yet it provides a workable framework in the absence of firm-level policy-exposure data.

Table 1

Summary statistics for the sector and stock price variables of listed firms¹

Summary	Stock price change	Firm sector
Count	85	85
Unique categories	3	10
Most frequent value	no change	finance
Frequency of that value	36	33

Table 1 shows that the dataset contains 85 listed companies with complete observations for both price movement and sector classification. Price outcomes fall into three categories, with no change the most frequent, recorded for 36 firms, which reflects the moderate trading intensity characteristic of a market at an early stage of expansion. The sector variable comprises ten industries, with finance the largest group at 33 firms, a composition that mirrors the strong presence of banks and financial

¹ Source: author's calculations based on [2].

institutions among listed companies. This concentration shapes the distribution of outcomes and the statistical power of sector-based tests, and is taken into account when the results are interpreted.

To assess whether price movements are independent of industry classification, the study applies a chi-square test of independence to a contingency table of sectors and price categories. The null hypothesis states that price movements are distributed independently of sector, while the alternative posits a systematic association. Alongside the chi-square statistic and its p-value, effect-size considerations are reported, which matters because the statistic responds to sample size and category composition.

All data processing and estimation were carried out in the Python programming language within a Jupyter Notebook environment, which supports interactive and fully reproducible work. Python handled data cleaning, variable construction and statistical testing, with each analytical step documented. The study uses established scientific libraries: Pandas for data manipulation, NumPy for numerical operations, SciPy and Statsmodels for statistical testing, and Matplotlib and Seaborn for visualisation and exploratory checks. These open-source tools make the results replicable and align the analysis with current standards in empirical economic and financial research.

The findings are read as descriptive evidence of sectoral heterogeneity in market responses. Market-wide movements, liquidity conditions and firm-specific developments also shape prices independently of sectoral characteristics, and the design accordingly sets the stage for further work incorporating firm-level ownership data, reform timelines and real-sector performance indicators.

ANALYSIS AND RESULTS

The analysis opens with the descriptive distribution of price outcomes across industries and proceeds to the formal test of independence. Figure 1 presents the proportional distribution of price rises, falls and no-change outcomes by sector in 2024.

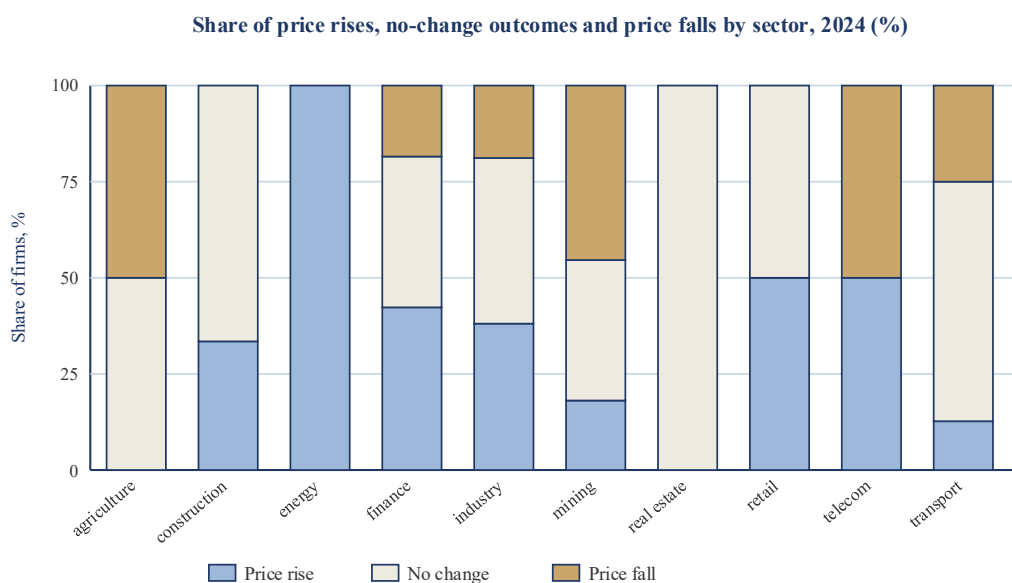


Figure 1. Proportional distribution of stock price movements across economic sectors, 2024 [2].

A first feature of Figure 1 is the prominence of the no-change category in several sectors, notably real estate, construction and transport, where prices adjusted within narrow bounds over the year. This pattern is typical of a market whose trading base is still widening. Finance and industry, by contrast, display a more balanced spread across the three categories, which indicates comparatively higher activity and a wider dispersion of investor expectations in the segments where listings are concentrated.

Clear sectoral asymmetries are also visible. Energy is characterised entirely by price rises, a result consistent with strong investor attention to the strategic role of the sector and to firm-specific announcements within it. Mining and agriculture record higher proportions of declines, which points to sector-specific conditions in that particular year. Telecommunications shows a polarised pattern, with rises and falls in equal measure, indicating heterogeneity among individual firms rather than a uniform sectoral trend. Taken together, the figure supports the premise that market responses vary across sectors and motivates the formal test that follows.

The observed contingency table summarises the joint distribution of price movements and sectoral classification (Table 2).

Table 2

Observed values in the cross-tabulation of sector and stock price change[2].

Sector	Price fall	No change	Price rise	Total
Agriculture	1	1	0	2
Construction	0	2	1	3
Energy	0	0	2	2
Finance	6	13	14	33
Industry	4	9	8	21
Mining	5	4	2	11
Real estate	0	1	0	1
Retail	0	1	1	2
Telecommunications	1	0	1	2
Transport	2	5	1	8
Total	19	36	30	85

Finance accounts for the largest number of observations in every outcome category, with price rises (14 firms) exceeding falls (6) and no-change outcomes (13), a distribution that reflects both the weight of the sector in the sample and its comparatively higher trading activity. Industry shows a similar concentration of rises (8) and no-change observations (9), indicating mixed but active market behaviour. Energy and real estate display markedly uneven distributions, with energy consisting entirely of price rises and real estate of a single no-change outcome, which reflects sector-specific dynamics and the small number of listings in those segments. The table therefore establishes the sectoral imbalances that the formal test evaluates.

The expected frequency table reports the cell values that would arise under the null hypothesis of independence (Table 3). These counts follow from the marginal distributions of sectors and outcome categories and so reflect the relative size of each sector rather than sector-specific behaviour.

Table 3

Expected values for the sector and stock price change cross-tabulation[2].

Sector	Price fall	No change	Price rise
Agriculture	0.45	0.85	0.71
Construction	0.67	1.27	1.06
Energy	0.45	0.85	0.71
Finance	7.38	13.98	11.65
Industry	4.69	8.89	7.41
Mining	2.46	4.66	3.88
Real estate	0.22	0.42	0.35
Retail	0.45	0.85	0.71
Telecommunications	0.45	0.85	0.71
Transport	1.79	3.39	2.82

Finance and industry carry the highest expected frequencies in every outcome category, while agriculture, energy and real estate fall below one in several cells. The presence of small expected frequencies reflects the uneven sectoral composition of the sample and is taken into account when the chi-square result is read, since departures in such cells carry disproportionate weight in the statistic.

The chi-square test of independence yields a statistic of 16.34 with 18 degrees of freedom and a p-value of approximately 0.047. At the conventional 5 per cent level the null hypothesis of independence is rejected, so price movements were not distributed uniformly across sectors during 2024. The p-value lies close to the threshold, and several cells hold low expected frequencies, so the association is best described as detectable and moderate rather than strong. Both features follow naturally from a compact sample drawn from a market whose listing base continues to broaden.

Substantively, the results point to differentiated market responses across sectors, a pattern consistent with variation in ownership structure, regulatory environment and exposure to reform measures. The test establishes association rather than causation and does not quantify the economic magnitude of the differences, which makes it a well-suited first step for an exploratory study and a clear starting point for research using richer data and more granular policy indicators.

In summary, stock price movements on the Uzbek Stock Exchange in 2024 exhibit modest yet statistically detectable sectoral differences. Descriptive evidence and formal testing together indicate heterogeneous market behaviour across industries, with the strength of the association shaped by sample size and sectoral representation.

CONCLUSION AND SUGGESTIONS

The study set out to establish whether market-oriented reforms in Uzbekistan are reflected in stock price behaviour across economic sectors. Firm-level data for 85 companies listed on the Tashkent Republican Stock Exchange in 2024 were classified into rises, falls and no-change outcomes and examined against industry classification through a chi-square test of independence, with the design positioned as exploratory.

The empirical results indicate a moderate association between sectoral classification and price movements. The test rejects independence at the 5 per cent

level, so outcomes are not uniformly distributed across industries. Descriptive evidence adds detail: some sectors show active price formation, while others are dominated by no-change outcomes. The statistical margin is narrow and several cells hold low expected frequencies, which reflects the sectoral composition of the sample.

From an economic standpoint, the findings indicate that the Uzbek stock market already incorporates sector-specific information and reform-related signals into prices, most visibly in sectors with higher trading activity and greater exposure to policy initiatives. Price inertia among the remaining firms reflects a listing base that is still expanding, and further growth in liquidity and investor participation will widen the transmission of policy effects through capital market channels. Stock price movements therefore serve as a useful complementary indicator of real economic responses to reform, most informative when combined with other measures.

The methodology offers several advantages. Categorical analysis and non-parametric testing suit compact samples, reduce sensitivity to extreme values in returns, remain transparent and replicable, and require minimal distributional assumptions. The approach also has recognised boundaries: discretising continuous price changes sets aside information on the magnitude of returns, sector classification approximates ownership and policy exposure, and the test identifies association without establishing direction of influence.

On this basis the study proposes the following:

first, continue deepening market liquidity and broadening investor participation, so that price formation covers a wider share of listed firms;

second, advance disclosure standards and transparency, particularly for firms with state participation, which strengthens the informational content of prices;

third, complement market-based indicators with firm-level ownership data and real-sector performance measures when capital markets are used as a barometer of reform progress;

fourth, extend the empirical design to multi-year panels with effect-size reporting and firm-level controls for size, liquidity and ownership share, which would move the analysis from description towards stronger inference.

Strengthening these foundations will further improve the capacity of the stock market to reflect and support the broader economic transformation of Uzbekistan.

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