UNDERPRICING OF IPOS (INITIAL PUBLIC OFFERING) IN BORSA ISTANBUL: THE EFFECT OF COVID-19 PANDEMIC PERIOD

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ABSTRACT

Purpose- This research has both theoretical and practical implications. The study's findings will provide valuable insights into the impact of the COVID-19 pandemic on IPO mispricing in the Turkish IPO market. The study delves into the behavior of IPOs that were issued between 2010 and 2022, with a focus on how they were affected by the COVID-19 pandemic. The results may help investors and issuers understand the pandemic's effects on IPO pricing and inform their investment decisions. The study will also provide valuable insights to investors, regulators, and market participants, allowing them to make more informed decisions during market volatility and uncertainty periods.

Methodology- The study involves employing two methods: the traditional ordinary least squares (OLS) and the more appropriate quantile regression (QR). The OLS method focuses on assessing the average impact of independent variables on mispricing, disregarding the unexplored latent characteristics of the mispricing distribution, especially when it deviates from a normal distribution. In contrast, the QR method allows us to investigate the diverse effects of independent variables at different levels of mispricing due to the asymmetric distribution of returns. By employing the QR approach, it can be identified the specific impacts of each variable on IPOs within particular levels of mispricing. This robust method is capable of handling potential heterogeneity in the distribution, which was observed in the sample. The QR method also facilitates the examination of various segments of the mispricing distribution, including the tail regions, enabling a comparison of the effects of explanatory factors on IPOs that range from extremely overpriced to extremely underpriced. Due to the constraints of the project, the paper has been done with a limited number of shares.

Findings- The study investigates the impact of the COVID-19 pandemic on Initial Public Offering (IPO) mispricing in financial markets, examining changes in mispricing levels before, during, and after the pandemic. The results indicate a significant increase in IPO mispricing during the COVID-19 period, consistent with expectations due to factors such as heightened asymmetric information, reduced IPO volume, and decreased demand.

The analysis tests the hypothesis that Covid-19 has a significant impact on IPO results. The results show that the null hypothesis (H0) cannot be rejected, supporting the notion that the pandemic has a substantial effect on IPO mispricing. This is particularly evident in equations examining 1-year returns. Furthermore, the study explores the influence of various factors on IPO mispricing, including stock market indices and dummy variables representing different years. While some index values are found to be insignificant, the Borsa Istanbul-All Index and dummy variables for 2020, 2021, and 2022 are significant in specific equations. Notably, the persistence of the impact of COVID-19 beyond the relevant period suggests a lasting effect on IPO mispricing.

Examining sector-specific effects, the study finds that, based on first-day returns, all sector values, except for SEC 3 (Consumer Non-Cyclicals), are significant. However, for 1-year returns, only SEC 5 (Financials) and SEC 4 (Energy) exhibit significance, with the latter being slightly above the 10% limit. The increasing demand for energy companies in recent times is identified as a potential driver for higher levels of "IPO underpricing" in specific IPOs within these sectors.

Conclusion- The study provides robust evidence of increased IPO mispricing during the COVID-19 pandemic, highlighting the persistent impact of the crisis on financial markets, as well as sector-specific nuances influencing mispricing levels.

Keywords: IPOs (Initial Public Offerings), mispricing, pandemic, initial returns, long-term returns
JEL Codes: C21, C23, D81, E44, G14

1. INTRODUCTION

IPO (Initial Public Offering) mispricing has been a topic of interest in the finance and economics literature for several decades. Researchers have examined various factors that contribute to IPO mispricing, the consequences of mispricing, and potential explanations for the phenomenon. IPO mispricing refers to the deviation of the offer price from the actual market value of newly issued shares. It is typically measured as the difference between the offer price and the first-day closing price or the initial return of the stock.

Underpricing is a common form of IPO mispricing, where the offer price is set below the stock's market value. This results in a significant initial return for investors who are allocated shares in the IPO. Overpricing, on the other hand, occurs when the offer price is set above the stock's market value, leading to negative initial returns. Numerous factors contribute to IPO mispricing, including **information asymmetry**, where disparities between issuers and investors hinder accurate valuation; **market conditions**, with bullish markets increasing demand and underpricing; the **book-building process**, involving negotiations between issuers, underwriters, and institutional investors; **investor sentiment**, where positive feelings drive up demand and contribute to underpricing; and **reputation signaling**, where companies intentionally underprice to signal quality and attract investors. IPO mispricing has consequences for different market participants: **issuers** face missed capital-raising opportunities or lack of investor interest based on underpricing or overpricing, respectively; **investors** receiving IPO allocations benefit from underpricing, but subsequent investors may suffer negative returns from inflated initial prices; **underwriters'** reputation and pricing accuracy for future offerings are influenced by mispricing; and the **efficient market** hypothesis is challenged, indicating markets may not always fully reflect fundamental values.

The COVID-19 outbreak a pandemic, started in March 2020, which led to a global economic downturn and heightened uncertainty in financial markets worldwide, including the IPO market. Researchers have examined the effects of the pandemic on IPO underpricing, exploring how market conditions, investor sentiment, and other factors have influenced the mispricing phenomenon. Understanding the impact of the pandemic on IPO underpricing can provide insights into changes in market dynamics, investor behavior, and the overall functioning of the IPO market during times of crisis. This research paper specifically examines the impact of the pandemic on IPO activity, with a focus on the increase in information uncertainty. To measure this effect, we use underpricing and post-IPO stock return volatility as proxies.

2. LITERATURE REVIEW

Researchers have put forth various theories to elucidate IPO mispricing, encompassing information-based explanations involving asymmetry, uncertainty, and informed traders; behavioral finance theories centered on investor sentiment, herding behavior, and overreaction to news; signaling models positing underpricing as a deliberate strategy for signaling quality and enticing investors; and institutional factors encompassing regulatory requirements, underwriter reputation, and the influence of investment banks in determining IPO prices.

2.1. Literature Review: IPO Underpricing

The phenomenon known as IPO underpricing is widely recognized as empirical evidence of high first-day returns for IPO firms. Since the Securities and Exchange Commission conducted a study in 1971, it has been evident that IPO stocks are initially priced lower than their subsequent sale price in the secondary market. This trend of IPO mispricing has persisted over time, as demonstrated by the frequency of studies analyzing the mispricing of IPOs in Figure 1. In 1973, Dennis Logue (Logue, 1973) published the first academic paper on the subject of IPO mispricing. Titled "On the Pricing of Unseasoned Equity Issues: 1965-1969," the study examined 250 IPOs released between 1965 and 1969. The search yielded a second article, namely Ibbotson's (Ibbotson, 1975) study named "Price Performance of Common Stock New Issues." In this study, the author analyzed a sample of 120 IPOs released between 1960 and 1969. After Ibbotson's work, numerous studies have confirmed the significant initial day returns for IPO stocks. These studies have put forth various explanations for underpricing, including information asymmetry among investors, the reputation of underwriters signaling by qualitative firms, and other factors.

Figure 1: Frequency of publications by years related to "IPO Mispricing/Underpricing"
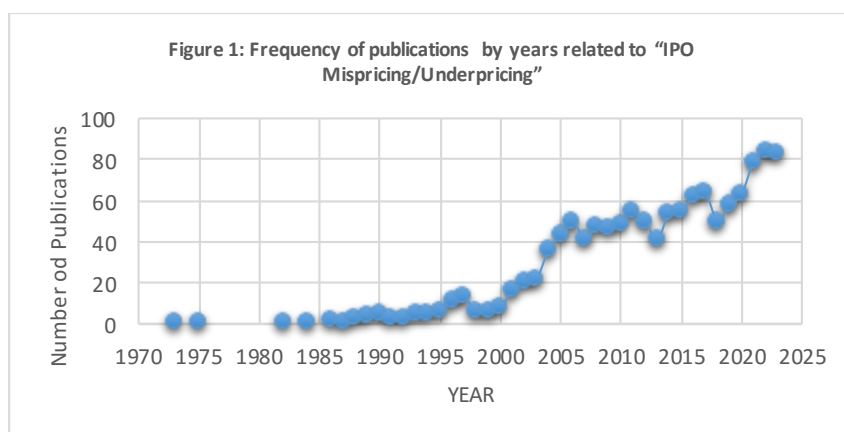
Source: Scopus Data; Filter: "IPO" & "Mispricing" and "IPO" & "Underpricing", As of 13/06/2023

2.2. Literature Review: IPO Underpricing during COVID-19

Existing studies done by Baig in 2021 and 2022 and Zaremba in 2022, on equity, debt, and derivative markets demonstrate that the severity of the COVID-19 outbreak, coupled with government policy measures, resulted in higher levels of volatility and uncertainty. It is anticipated higher levels of underpricing and volatility for IPOs that were issued during the pandemic. This is because increased uncertainty is typically associated with higher levels of IPO underpricing, and it is natural to expect greater underpricing during times of economic distress. Government intervention and stimulus measures implemented in response to the pandemic could have influenced IPO underpricing. These measures aimed to stabilize financial markets and support economic recovery. The provision of liquidity and favorable market conditions resulting from government actions may have positively impacted IPO underpricing. The COVID-19 pandemic compelled governments to swiftly adapt and take action to protect both the health and the economy of their respective countries. However, there were notable variations in how different countries handled the crisis, resulting in divergent outcomes. Therefore, this paper focuses on analyzing the IPO changes in Turkey, to identify the underlying factors behind these changes. It is apparent that informational shocks and government responses related to the pandemic have had a significant impact on the IPO markets, and our research aims to shed light on these effects.

2.3. Literature Review: Underpricing in the Turkish IPO Market

The first study conducted on the IPO market in Turkiye emerged in the year 2000 (Kiymaz, 2000). In his research, he took 163 firms listed and traded on the Istanbul Stock Exchange between 1990 and 1996. This research again focused on initial (first trade date) return and the results show that the Turkish IPOs are underpriced on the initial trading day by an average of 13.1%. In his research, he also made a sub-sector analysis for IPO underpricing. Then in 2006, M. Banu Durukan (Durukan, 2006) showed that the relationship between ownership structure and underpricing is weak and Mehmet Orhan (Orhan, M, 2006) investigated underpricing on the Istanbul Stock Exchange for 18 sectors for the period 1996–2005. His analysis showed that half of the sectors provided a negative first-day return.

Other research regarding Turkish IPO Market Underpricing is also mainly concentrated on "Initial Returns" and "Ownership" and commitment period. Finally, in 2023, there is research (Ilbasmış, M., 2023) related to the effect of uncertainty on IPO underpricing, short-term performance after IPO, and hot-and-cold-IPO market cycles. Empirical results show that short-term market-adjusted abnormal returns of IPO firms during the pandemic are much larger than those before the pandemic.

Table 1: Mispricing Across Time and Markets

Country	Study	Year	Period	Mean(%)	Median(%)
US	Miller & Reilly	1987	1982 - 1983	9,87	2,78
Hong Kong	McGuinness	1992	1980 - 1990	17,60	
US	Michaely & Shaw	1994	1984 - 1988	7,27	
Australia	Lee et al.	1996	1976 - 1989	16,41	10,00
Germany	Ljungqvist	1997	1970 - 1993	9,20	
Japan	Hamaoi Packer, Ritter	2000	1989 - 1995	15,70	
Malaysia	Jelic, Saadouni & Briston	2001	1980 - 1995	99,25	79,04
Canada	Kooli & Suret	2001	1991 - 1998	20,57	5,00
Belgium	Engelen	2003	1996 - 1999	14,32	
China	Wang	2005	1994 - 1999	271,90	123,90
UK	Hill & Wilson	2006	1991 - 1998	11,41	
Malaysia	Ahad-Zaluki et al.	2007	1990 - 2000	95,20	76,50
China	Guo & Brooks	2008	1984 - 2005	378,40	119,37
Turkiye	Kucukkocaoglu	2008	1993 - 2005	7,01	7,67
France	Chahine and Filatotchev	2008	1997 - 2000	22,70	9,80
Taiwan	Lee & Kua	2010	1997 - 2007	28,42	17,98
China	Lee, Hsieh & Yen	2010	1993 - 2005	144,42	108,16
Brazil	Boulton, Smart & Zutter	2010	2000 - 2004	13,70	13,90
China	Gao	2010	2006 - 2008	157,00	
India	Hopp & Dreher	2013	1988 - 2005	96,74	
Singapore	Hopp & Dreher	2013	1988 - 2005	22,43	
South Korea	Lin et al.	2013	1991 - 2011	55,83	36,19
New Zealand	Lin et al.	2013	1991 - 2011	17,95	31,51
Indonesia	Husnan, Hanafi & Muhandar	2014	1995 - 2012	23,06	15,42
Greece	Autore et al.	2014	1998 - 2008	58,30	
Taiwan	Chang, Chen, Kao & Wu	2014	2006 - 2010	50,60	34,00
US	Chang et al.	2014	2006 - 2010	13,36	6,27
Australia	Bird & Ajmal	2016	1995 - 2013	25,51	8,62

3. DATA & METHODOLOGY

3.1. Data Collection

The study uses a quantitative research approach, and data will be gathered on IPOs launched in the Turkish market during the period from January 2010 to December 2022 from the Borsa Istanbul website, company prospectuses, and financial news reports. BIST-ALL, BIST-100, and BIST-Sector returns have also been included in the research for the determination of the actual return performances of IPOs for the relevant time period. Additionally, pandemic-related data such as stock returns, offer prices, and market conditions.

3.2. IPO Initial Return Calculation

The study will employ regression analysis to determine whether there is a significant relationship between the COVID-19 pandemic and IPO mispricing. The analysis will also control for other variables such as market conditions, company size, and industry sector. The first step is calculating the initial returns of IPOs as a measure of mispricing. Then compare the IPO offer price with the closing price on the first day, on the week-end, on the month-end, on the 3-month-end, on the 6-month-end, and year-end trading.

$Initial\ Return_i = \frac{CP_i - AOP}{CP_i}$ where CP_i is the closing price on the trading date and AOP is the Adjusted-Offer-Price.   (1)

Adjusted-Offer-Price (AOP) is the retroactively corrected version of the initial public offering (IPO) price due to subsequent capital increases through paid-in and bonus share issuances, as well as dividend payments by the company. So,

$AOP = OP\ x\ PAF$ where OP is the Offer-Price and PAF is the Price-Adjustment-Factor.   (2)

$Adjusted\ Initial\ Return_i = Initial\ Return_i - MR_i$ where MR_i is the Market Return for the related time period.   (3)

For this study, for market returns, the "Adjusted Returns" calculation includes not only the BIST-100 but also the BIST-ALL, calculated by considering all stocks, and sector-specific BIST-Sector indices.

3.3. Variables Used in Equations

Y1: Return on first trade date	SEC1	Basic Materials	SEC7	Industrials
Y2: Return on first week	SEC2	Consumer Cyclicals	SEC8	Real Estate
Y3: Return on first month	SEC3	Consumer Non-Cyclicals	SEC9	Technology
Y4: Return on Month-3	SEC4	Energy	SEC10	Utilities
Y5: Return on Month-6	SEC5	Financials		
Y6: Return on first year	SEC6	Healthcare		

$DYEAR_t$: Dummy variable for the year of IPO (t = 2010, 2011, ..., 2022)

$DSEC_i$: Dummy variable for the sector/industry of Equity

P_0: Initial Return of the equity on a specific time period (First trade date, first week, first month, third month, sixth month, and first year)

P_{ALL}: Initial Return of the overall stock exchange on a specific time period (First trade date, first week, first month, third month, sixth month, and first year)

P_{100}: Initial Return of the BIST 100 (Borsa Istanbul 100 index) on a specific time period (First trade date, first week, first month, third month, sixth month, and first year)

P_{SEC}: Initial Return of the related Equity's Sector Index on a specific time period (First trade date, first week, first month, third month, sixth month, and first year)

3.4. Hypothesis and Equations

This research aims to analyze below hypothesis:

H01: In the long run (1-year) there is mispricing(underpricing) in Turkish IPO Market

H02: The COVID-19 pandemic has led to increased IPO mispricing in the Turkish market.

Based on these hypotheses, in the first section of the research, clarity will be provided regarding whether there is an error in the pricing of IPOs in the long term. While conducting this study, on the one hand, returns will be taken into account, and on the other hand, the effects of year and sector factors will be eliminated. In the second section, the impact of the COVID-19 period on this pricing will be examined based on the final values obtained.

Since the dummy variables DYEAR and DSEC are included in the equations, a constant term is not used in the equations to avoid the perfect **multicollinearity** problem.

Equations for IPO Mispricing and COVID Impact

Equation 1. Y1 First Trade Date

$\Delta LnP_0 = COVID + \beta_1 \Delta Ln\,P_{ALL} + \beta_2 \Delta LnP_{100} + \beta_3 \Delta Ln\,P_{SEC} + \sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j$ (4)

H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$

Equation 2. Y2 Week 1

$$\Delta LnP_0' = COVID + \Delta LnP_0 + \beta_1 \Delta LnP_{ALL}' + \beta_2 \Delta LnP_{100}' + \beta_3 \Delta LnP_{SEC}' + \sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j \tag{5}$$

H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ and H_0: $\alpha_1 = 0$

Equation 3. Y3 Month 1

$$\Delta LnP_0'' = COVID + \alpha_1 \Delta LnP_0 + \alpha_2 \Delta LnP_0' + \beta_1 \Delta LnP_{ALL}'' + \beta_2 \Delta LnP_{100}'' + \beta_3 \Delta LnP_{SEC}'' + \sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j \tag{6}$$

H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ and H_0: $\alpha_1 = \alpha_2 = 0$

Equation 4. Y4 Month 3

$$\Delta LnP_0''' = COVID + \alpha_1 \Delta LnP_0 + \alpha_2 \Delta LnP_0' + \alpha_3 \Delta LnP_0'' + \beta_1 \Delta LnP_{ALL}''' + \beta_2 \Delta LnP_{100}''' + \beta_3 \Delta LnP_{SEC}''' + \sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j \tag{7}$$

H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ and H_0: $\alpha_1 = \alpha_2 = \alpha_3 = 0$

Equation 5. Y5 Month 6

$$\Delta LnP_0'''' = COVID + \alpha_1 \Delta LnP_0 + \alpha_2 \Delta LnP_0' + \alpha_3 \Delta LnP_0'' + \alpha_4 \Delta LnP_0''' + \beta_1 \Delta LnP_{ALL}'''' + \beta_2 \Delta LnP_{100}'''' + \beta_3 \Delta LnP_{SEC}'''' +$$

$$\sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j \tag{8}$$

H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ and H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$

Equation 6. Y6 Year 1

$$\Delta LnP_0''''' = COVID + \alpha_1 \Delta LnP_0 + \alpha_2 \Delta LnP_0' + \alpha_3 \Delta LnP_0'' + \alpha_4 \Delta LnP_0''' + +\alpha_5 \Delta LnP_0'''' + \beta_1 \Delta LnP_{ALL}''''' + \beta_2 \Delta LnP_{100}''''' + \beta_3 \Delta LnP_{SEC}''''' +$$

$$\sum_{t=1} DYEAR_t + \sum_{i=1} DSEC_i + \varepsilon_j \tag{9}$$

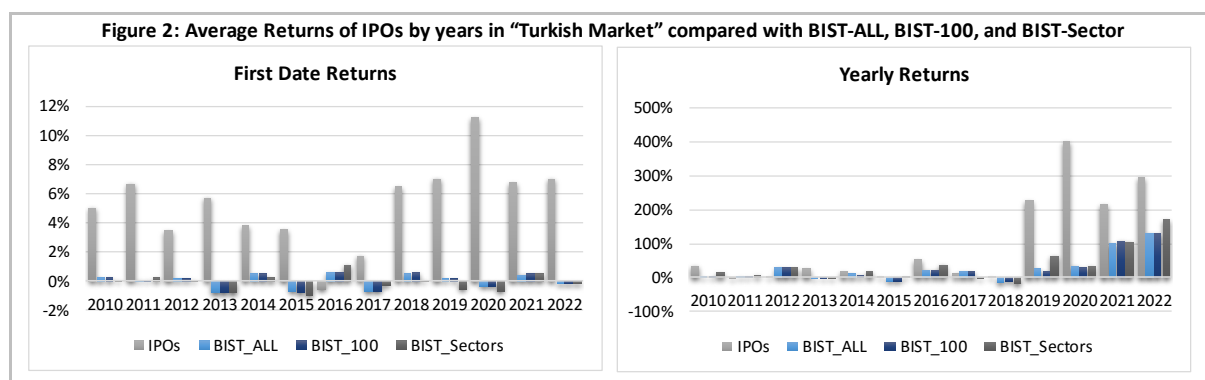H_0: *COVID has a significant impact on IPOs*

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ and H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$

4. EMPIRICAL RESULTS

The pandemic has led to increased uncertainty and volatility in financial markets, which could have resulted in mispricing. The study finds evidence of increased IPO mispricing during the Covid-19 pandemic. Additionally, the study may reveal differences in mispricing levels before and after the outbreak of the pandemic.

The results include:

- Statistical results present a detailed analysis of returns, BIST-ALL adjusted returns, BIST-100 adjusted returns, and BIST-Sector adjusted returns for three different periods: Full Period (n=204), Pre-Covid (n=127), and During-After Covid (n=77). In summary, there are significant differences in Means and Standard Deviations in "Adjusted Market Returns" which means IPO companies have higher returns compared to the market or in other words, IPOs in general were underpriced during offerings.

- COVID impact tested for each equation and the results show that we cannot reject the H0, which means COVID-19 pandemics have a significant impact on IPO results.

- "Y3" (Month-End Returns) has a positive coefficient (0.782) with a strong significant probability (0.001) in Equation 4 and "Y1" (First-Date Returns) has a positive coefficient (3.036) with a significant probability (0.032) in Equation 6.

- While all index values are insignificant for Equation 1, we see that only the Borsa Istanbul-All Index is significant in our equation in Equation 6, that is when we consider 1-year returns. Due to the broadened definition of "IPO underpricing" in this study (considering not only initial day returns but also returns for various periods, including up to one year), the previously observed high values of "IPO underpricing" in earlier studies are lower.

Figure 2: Average Returns of IPOs by years in "Turkish Market" compared with BIST-ALL, BIST-100, and BIST-Sector

- In addition to this, it can be seen that the dummy variables D2020, D2021, and D2022 are also significant in all equations. These results had already emerged while conducting the COVID-19 analysis. However, it is understood from these results that the impact of COVID continues not only in the relevant period but also in 2022.

- Considering the first-day returns of IPOs, all sector values except SEC 3 (Consumer Non-Cyclicals) are significant (SEC 3 has a non-significant p-value (0.142)), while based on 1-year returns, it is possible to say that the effect of only SEC5 (Financials) and SEC4 (Energy), which is slightly above the 10% limit, continues. Particularly in recent times, there has been an increasing demand for energy companies, which may lead to higher levels of "IPO underpricing" in specific IPOs, especially those conducted in these sectors.

4. CONCLUSIONS

Understanding the effects of COVID-19 on IPO mispricing in the Turkish market is crucial for developing effective strategies to mitigate pricing anomalies during future crises. This research proposal outlines the objectives, research methodology, results, and implications of the study.

Market Returns Analysis: There are significant differences in means and standard deviations in "Adjusted Market Returns" across various periods, indicating that IPO companies had higher returns compared to the market. This implies a trend of underpricing during offerings.

COVID-19 Impact Analysis: The study tests the impact of COVID-19 on IPO results for each equation. The results suggest a significant impact, with coefficients and probabilities varying across equations. Notably, the impact includes increased asymmetric information, reduced IPO volume, and decreased demand, leading to higher rates of IPO underpricing during the COVID-19 period compared to before and after the pandemic.

Equation-Specific Results: Each equation reveals specific insights into the factors influencing IPO underpricing. For instance, Equation 3 shows a substantial positive relationship between ΔLnP_ALL and the dependent variable, while Equation 4 indicates that ΔLnP_SEC is not statistically significant. The results vary across equations, emphasizing the importance of considering different variables.

D2020, D2021, D2022 Impact: The dummy variables D2020, D2021, and D2022 are found to be significant in all equations, indicating that the impact of COVID-19 continues not only in the relevant pandemic period but also extends into 2022.

Sector-Specific Analysis: The study explores sector-specific impacts on IPO returns. While the first-day returns of IPOs across sectors are mostly significant, 1-year returns show continued effects primarily in the Financials and Energy sectors.

Month-End and First-Date Returns: Specific variables, such as "Y3" (Month-End Returns) in Equation 4 and "Y1" (First-Date Returns) in Equation 6, demonstrate significant positive coefficients, indicating their influence on the dependent variables.

Limitations and Implications: The study notes that the broadened definition of "IPO underpricing," considering returns for various periods, has led to lower values compared to earlier studies. This underscores the importance of refining measurement metrics.

Continued Impact of COVID-19: The results highlight that the impact of COVID-19 continues, as evidenced by the significant coefficients associated with the "COVID" variable in various equations.

In conclusion, the study provides valuable insights into the dynamics of Turkish IPOs during and after the COVID-19 pandemic. The findings contribute to the understanding of market behavior, IPO underpricing trends, and the persistent impact of external shocks on financial markets.

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