

**PRICE IMPACTS OF  
LARGE TRADES IN FUTURES  
MARKETS: EVIDENCE  
FROM TURKEY**

*Hacettepe University  
Journal of Economics  
and Administrative  
Sciences  
Vol. 35, Issue 3, 2017,  
pp. 73-82*

**İbrahim Yaşar GÖK**

Assist.Prof.Dr., Süleyman Demirel  
University  
Faculty of Economics and Administrative  
Sciences  
Department of Banking and Finance  
ibrahimgok@sdu.edu.tr

**Meral ARSLAN**

Ph. D. Candidate, Süleyman Demirel  
University  
Institute of Social Sciences  
Business Administration  
meralarlan81@gmail.com

**A**bstract: This study examines the price impacts of large trades in the Turkish index futures market. It is found that total price effect increase with trade size, and the total price effect of large buy trades are greater than sell trades. Liquidity effect results indicate that price reversals occur after larger sell trades, although price continuations occur after large buy trades. Information effect results suggest that because large buy trades have a positive information effect, they contain information, but this is not the general case for large sell trades. In terms of current market condition, the total price effect of large buy trades are greater than sell trades in bullish markets, and the reverse asymmetry exists in bearish markets. This result indicates that current economic condition plays an important role in explaining the price impact asymmetry between large buy and sell trades.

**Keywords:** *Market microstructure, large trades, price impact, futures market.*

# FUTURES PİYASALARDA BÜYÜK İŞLEMLERİN FİYAT ETKİLERİ: TÜRKİYE ÖRNEĞİ

Hacettepe Üniversitesi  
İktisadi ve İdari Bilimler  
Fakültesi Dergisi,  
Cilt 35, Sayı 3, 2017,  
s. 73-82

## İbrahim Yaşar GÖK

Yrd.Doç.Dr., Süleyman Demirel  
Üniversitesi  
İktisadi ve İdari Bilimler Fakültesi  
Bankacılık ve Finans Bölümü  
ibrahimgok@sdu.edu.tr

## Meral ARSLAN

Dok.Öğr., Süleyman Demirel Üniversitesi  
Sosyal Bilimler Enstitüsü  
İşletme ABD  
meralarlan81@gmail.com

**Öz:** Bu çalışma, Türkiye endeks futures piyasasında büyük işlemlerin fiyat etkilerini araştırmaktadır. Toplam fiyat etkisinin işlem hacmi ile birlikte arttığına ve büyük alış işlemlerinin toplam fiyat etkisinin büyük satış işlemlerinden daha büyük olduğuna ulaşılmıştır. Likidite etkisi sonuçları, büyük alış işlemlerinden sonra fiyat artışının sürdüğüne, büyük satış işlemlerinden sonra ise fiyat geri dönüşlerinin meydana geldiğine işaret etmektedir. Bilgi etkisi sonuçları ise, büyük alış işlemleri pozitif bilgi etkisine sahip olduğundan bunların bilgiyi içerdiğini belirtirken, büyük satış işlemleri için bu genel bir durum değildir. Mevcut piyasa koşulları açısından, boğa piyasası döneminde büyük alış işlemlerinin toplam fiyat etkisi satış işlemlerinden daha büyük iken, ayı piyasası döneminde ise tersine bir asimetrisinin varlığı söz konusudur. Bu sonuç, mevcut ekonomik koşulların, büyük alış ve satış işlemleri arasındaki fiyat etki asimetrisini açıklamada önemli bir rol oynadığına işaret etmektedir.

**Anahtar Sözcükler:** Piyasa mikroyapısı, büyük işlemler, fiyat etkisi, futures piyasa.

## INTRODUCTION

Large, or block, trades have an important trading volume share in many stock and futures markets, and as stated by Chou *et al.* (2011) because their price impacts are a substantial part of implicit trading costs, which affect the selection of a trading strategy as well as investment performance, such trades are an interesting topic within the market microstructure field for market participants.

Price impact refers to the market impact cost of trading and it is an implicit cost –not an explicitly stated cost- of a trade (Frino *et al.*, 2007). Market impact cost is one of the components of the total transaction cost and it emanates when the trade itself changes the price of the asset, hence it is the difference between the execution price and the price that would have been if the transaction had not been executed (Torre, 1998). The total price, or slippage, effect of large trades is decomposed into temporary and permanent price effects. The former is the price reversal after a large trade, and the latter, the change from the equilibrium price before the large trade to the equilibrium price after the large trade (Holthausen *et al.*, 1990). Holthausen *et al.* (1987) explain the price effects of large trades in equity markets with liquidity costs, inelastic demand curve and information effect. They state that while temporary effects can be attributed to liquidity costs, permanent effects can be explained by information effect and/or an inelastic demand curve. Because permanent price effect is related to the magnitude of information content of a trade, an efficient market has no place for asymmetric information whether a trade is large or small or is buy or sell (Ryu, 2013). On the other hand, trade size, whether large, medium or small, generally leads to different effects on prices in practice. Trade direction, whether buy or sell, also often has asymmetric price impacts.

Previous studies primarily focused on equity markets (Kraus, Stoll, 1972; Holthausen *et al.*, 1987, 1990; Chan, Lakonishok, 1995; Keim, Madhavan, 1996; Chiyachantana *et al.*, 2004) and they generally documented that total and permanent price effects of large purchases are higher than that of large sales in equity markets, though reverse asymmetry was rarely documented (Ren, Zhong, 2012).

To our knowledge, Frino, Oetomo (2005) conduct the first examination on the price impacts of futures trading packages. They examine the total, permanent and temporary price effects of trading packages for four futures contracts, including one index futures in the Sydney Futures Exchange. Contrary to the equity markets, they discover that trading packages convey little information and there is no price impact asymmetry between buy and sell trades. Additionally, they conclude that the trade size is a small portion of the total variation in the implicit cost of trading, which is found to be represented by liquidity cost in their study. Frino *et al.* (2008) analyse the price

impact of large outside customers for five futures contracts, including two index futures in the Chicago Mercantile Exchange. They determine that large purchases' permanent price effect is higher than that of large sales, and vice versa for temporary price effect, consistent with previous equity market findings. Their results indicate that large buy and sell trades have opposite price impact asymmetries in bullish and bearish markets, for both permanent and temporary price effects. Chou *et al.* (2011) estimate the total price effect, and its components for large institutional and individual transactions, by analysing three index futures in the Taiwan Futures Exchange. They ascertain that large purchases have higher permanent price effect than large sales, and reverse asymmetry exists between large purchases and sales for liquidity effects. In addition, current economic condition is noted as an important factor determining the price impact asymmetry of large buy and sell trades. Ryu (2013) examined the price impact asymmetry between buy and sell trades, and the relationship between information content and trade size, by analysing Korea's index futures contracts. They highlight that the permanent price effect of large trades is higher than that of small trades, and contrary to previous findings, the information content of seller-initiated trades is greater than that of buyer-initiated trades.

This article investigates the price impacts of large trades by using intraday transactions data of the Borsa Istanbul 30 (BIST 30) index futures contracts, which constitute more than 90% of total futures and options trading volume in the Borsa Istanbul. We also examine the price impacts of large trades in bullish and bearish markets. This study is the first to investigate the price effects of large futures trades in Turkey, and aims to fill the gap in literature concerning both Turkey and developing futures markets.

The rest of this article is organized as follows. Section II describes the data and methodology, Section III discusses results and the Section IV concludes.

## 1. DATA AND METHODOLOGY

We use the Borsa Istanbul's intraday BIST 30 index futures prices from 5 August 2013 to 30 June 2014. Since it includes only the code, the date, the time, the price and the quantity of transactions, we use the 'tick test' classification method of Lee, Ready (1991) to determine whether a transaction is buy or sell. According to the method, if the price at a given time is higher than the previous trade price, it is called 'uptick'. Also, if the price is the same with the previous trade price but the last price change was an uptick, it is called 'zero-uptick'. We can infer the trade's direction as a buy if a trade is an uptick or zero-uptick. Also, a downtick occurs if the price is below the previous trade price and a zero-downtick occurs if the price is the same with the previous trade price but the last price change was a downtick. If a downtick or zero-

downtick occurs for a trade, then the trade is classified as a sell. In our analysis, we use front-month contracts, which have the shortest time to maturity at a given date.

Following Holthausen *et al.* (1987), the price effects are calculated as follows:

$$\text{Total price effect} = \ln\left(\frac{P}{P_b}\right) * 100 \quad (1)$$

$$\text{Liquidity (temporary) price effect} = \ln\left(\frac{P}{P_a}\right) * 100 \quad (2)$$

$$\text{Information (permanent) price effect} = \ln\left(\frac{P_a}{P_b}\right) * 100 \quad (3)$$

where  $P$  represents the price of large trade,  $P_b$  is the equilibrium market price before the large trade, and  $P_a$  is the equilibrium price after the large trade. Opening prices are marked as  $P_b$ , and settlement prices as  $P_a$  in our analysis. Liquidity effect is expected to have a negative (positive) sign for sell (buy) trades, since the positive (negative) sign of sell (buy) trades indicates that the prices continue to decrease (increase) after sell (buy) trades, as stated by Frino *et al.* (2008) and Chou *et al.* (2011). Permanent price effect represents the trade's information content. All estimations of price effects are in percentage terms, and the sum of liquidity and permanent price effects is equal to the total price effect.

To define large transactions in futures market, we follow Frino *et al.* (2008), who develop five trade size categories based on empirical distribution of trading volume for all transactions: first size, up to the 50th percentile; second size, from the 50th percentile up to, but not including, the 70th percentile; third size, from the 70th percentile up to, but not including, the 90th percentile; fourth size, from the 90th percentile up to, but not including, the 95th percentile; and the fifth size, which is greater than the 95th percentile.

Following Frino *et al.* (2008), volume weighted price effects are also calculated to consider the volume effect, by dividing the trade volume by the total volume of related trade size category. Current economic conditions are considered, in line with Chiyachantana *et al.* (2004), and the price impacts of large trades in bullish and bearish markets are analysed.

## RESULTS

Table 1 provides descriptive statistics of transactions used in the study. The sample includes 2 671 646 buy and 2 635 270 sell trades. Table 1 demonstrates that as the trade size categories increase, the trading frequency decreases. The largest volume, in contrast, occurs in the fifth trade size category, which is 35.14% for buy trades, and 35.40% for sell trades.

**Table 1. Descriptive Statistics by Trade Size Categories**

	All		1		2		3		4		5	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
Total Trading Frequency	2 671 646	2 635 270	1 335 529	1 318 875	536 467	531 353	531 716	522 370	134 425	130 857	133 509	131 815
Percentage of Total Volume	-	-	9.77	9.79	12.03	12.12	27.71	27.56	15.35	15.13	35.14	35.40

Table 2 presents the total, temporary and permanent price effects in terms of the four largest trade size categories. Total, permanent and liquidity price effects increase with the trade size categories, except for the fourth category. The largest total, permanent and liquidity price effects occur in the largest trade size category. This result demonstrates the trade size categories' price impact asymmetry.

The total price effect of buy trades are larger than sell trades in each trade size category; for instance, for the largest trade size category, the total price effects are 0.0976% for buy trades and -0.0583% for sell trades. This finding is consistent with previous findings for index futures markets, in which Frino *et al.* (2008) report that total price effect for S&P 500 index futures' buy trades is 0.0952%, whereas sell trades is -0.0812%; the total price effect for NASDAQ 100 index futures' buy trades is 0.3144%, whereas sell trades is -0.2671%. Chou *et al.* (2011) also report that the total price effect of the Taiwan Stock Exchange index futures' buy trades is 0.1266%, whereas sell trades is -0.1297%.

**Table 2. Price Effects**

		Total Price Effect		Temporary Price Effect		Permanent Price Effect	
		Buy	Sell	Buy	Sell	Buy	Sell
2	Volume weighted	0.0188	-0.1496	-1.3774	-1.1697	1.3961	1.0201
	Mean	0.0275	-0.1376	-1.3859	-1.1776	1.4134	1.0399
3	Volume weighted	0.0316	-0.0768	-2.7282	-2.3325	2.7597	2.2557
	Mean	0.0370	-0.0755	-2.8104	-2.4085	2.8474	2.3330
4	Volume weighted	0.0247	-0.0949	-2.6201	-2.6024	2.6447	2.5075
	Mean	0.0215	-0.0971	-2.6029	-2.5998	2.6245	2.5027
5	Volume weighted	0.0976	-0.0583	-3.4885	-3.4970	3.5861	3.4387
	Mean	0.1160	-0.0406	-3.4549	-3.6342	3.5709	3.5936

Notes: All the estimations of price effects are in percentage terms.

Large buy trades have negative sign in terms of liquidity effect, indicating price continuations after large buy trades. Large sell trades also have negative sign, indicating price reversals after large sell trades. These results are consistent with the work of Frino *et al.* (2008), who reports similar findings for the S&P 500 index futures. The results are also partially consistent with the work of Frino *et al.* (2005) and Chou *et al.* (2011), who study, respectively, the Australian SPI 200 index futures contracts and the Taiwan Stock Exchange Index futures contracts.

Large buy and sell trades, in terms of information effect, have positive sign, suggesting that large buy transactions in the BIST 30 index futures contain information, but large sell trades have entirely liquidity effect. The information effect of large sell trades is consistent with the work of Frino *et al.* (2005), who illustrates little evidence that the Australian SPI 200 index futures trade packages convey information.

Chiyachantana *et al.* (2004) investigate the asymmetry of total price effects between large buy and sell trades in bullish and bearish markets. They conclude that although large buy trades have a higher total price effect than sells in bullish markets, it is the opposite in bearish markets. The sample period in the work of Chiyachantana *et al.* (2004), is classified in months; these months are categorized as bullish when a month's return is positive, and bearish, vice versa. According to this classification, we label 6 months as bullish and 5 months as bearish out of 11 months. Table 3 presents the results for price effects of large trades in bullish versus bearish markets.

We find that in bullish markets, large buy trades have a higher total price effect than sell trades, and in bearish markets, vice versa. These results are in line with previous research on equity markets (Chiyachantana *et al.*, 2004) and futures markets (Frino *et al.*, 2008; Chou *et al.*, 2011).

**Table 3. Price Effects in Bull and Bear Markets**

		Total Price Effect		Temporary Price Effect		Permanent Price Effect	
		Buy	Sell	Buy	Sell	Buy	Sell
<b>Panel A: Bullish Market (6 months)</b>							
<b>2</b>	Volume weighted	0.2836	0.1438	-3.1345	-2.7568	3.4180	2.9006
	Mean	0.2965	0.1594	-3.5336	-3.0888	3.8301	3.2482
<b>3</b>	Volume weighted	0.2884	0.1933	-5.2200	-4.6085	5.5085	4.8018
	Mean	0.2919	0.1919	-5.4371	-4.8094	5.7290	5.0013
<b>4</b>	Volume weighted	0.3134	0.2058	-4.9972	-5.2038	5.3106	5.4096
	Mean	0.3037	0.1991	-5.0219	-5.2476	5.3256	5.4468
<b>5</b>	Volume weighted	0.4199	0.2700	-6.5623	-6.7736	6.9822	7.0436
	Mean	0.3983	0.2591	-6.6375	-7.1822	7.0358	7.4413
<b>Panel B: Bearish Market (5 months)</b>							
<b>2</b>	Volume weighted	-0.2798	-0.4577	0.0660	0.0787	-0.3458	-0.5363
	Mean	-0.2652	-0.4403	0.0643	0.0746	-0.3296	-0.5149
<b>3</b>	Volume weighted	-0.2509	-0.3575	0.1100	0.1199	-0.3609	-0.4774
	Mean	-0.2409	-0.3521	0.1107	0.1208	-0.3516	-0.4729
<b>4</b>	Volume weighted	-0.2879	-0.4032	0.1086	0.1404	-0.3965	-0.5436
	Mean	-0.2882	-0.4054	0.1070	0.1369	-0.3951	-0.5423
<b>5</b>	Volume weighted	-0.2927	-0.4325	0.0790	0.1151	-0.3717	-0.5476
	Mean	-0.2302	-0.3828	0.1098	0.1314	-0.3400	-0.5142

Notes: All the estimations of price effects are in percentage terms.

## CONCLUSION

This study examines the total, permanent and temporary price effects of large futures transactions by analysing the BIST 30 index futures contracts, which constitute more than 90% of total volume in the Borsa Istanbul' futures and options market, in the period from August 2013 to June 2014. We investigate more than 5.3 million transactions and determine their trade direction by using the 'tick test' classification method, suggested by Lee, Ready (1991). We classify the transactions into five trade size categories, following Frino *et al.* (2008), and we observe that the largest trade size category has the largest volume share.

We find that total price effect increases with trade size category, and large buy trades have a greater total price effect than large sell trades, consistent with the findings

of prior research in equity and futures markets. The results for liquidity effect indicate that prices further increase after large buy trades, and price reversals occur after large sell trades. In terms of information effect, the positive sign of permanent price effect for both large buy and sell trades suggests that large buy trades contain information; on the other hand, this is not the general case for large sell trades.

We also investigate the price impact asymmetry of large buy and sell trades in bullish and bearish markets. We reveal that the total price effect of large buy trades are greater than that of large sell trades in bullish markets and the opposite asymmetry occurs in bearish markets, indicating that the current economic condition is an important factor to explain the price impact asymmetry of buy and sell trades. These results are important especially for institutional and international investors holding 35% and 25% of volume share in the futures and options markets of the Borsa Istanbul, respectively. These results also provide evidence of individual traders' activities predominantly occurring in the BIST 30 index futures market.

## REFERENCES

- Chan, L.K., J. Lakonishok (1995), "The Behavior of Stock Prices Around Institutional Trades", *The Journal of Finance*, 50(4), 1147-1174.
- Chiyachantana, C.N., P.K. Jain, C. Jiang, R.A. Wood (2004), "International Evidence on Institutional Trading Behavior and Price Impact", *The Journal of Finance*, 59(2), 869-898.
- Chou, R.K., G.H. Wang, Y. -Y. Wang, J. Bjursell (2011), "The Impacts of Large Trades by Trader Types on Intraday Futures Prices: Evidence from the Taiwan Futures Exchange", *Pacific-Basin Finance Journal*, 19(1), 41-70.
- Frino, A., T. Oetomo (2005), "Slippage in Futures Markets Evidence from the Sydney Futures Exchange", *The Journal of Futures Markets*, 25(12), 1129-1146.
- Frino, A., J. Kruk, A. Lepone (2007), "Transactions in Futures Markets: Informed or Uninformed?", *The Journal of Futures Markets*, 27(12), 1159-1174.
- Frino, A., J. Bjursell, G.H. Wang, A. Lepone (2008), "Large Trades and Intraday Futures Price Behavior", *The Journal of Futures Markets*, 28(12), 1147-1181.
- Holthausen, R.W., R.W. Leftwich, D. Mayers (1987), "The Effect of Large Block Transactions on Security Prices", *Journal of Financial Economics*, 19(2), 237-267.
- Holthausen, R.W., R.W. Leftwich, D. Mayers (1990), "Large-Block Transactions, the Speed of Response, and Temporary and Permanent Stock-Price Effects", *Journal of Financial Economics*, 26(1), 71-95.
- Keim, D.B., A. Madhavan (1996), "The Upstairs Market for Large-Block Transactions: Analysis and Measurement of Price Effects", *The Review of Financial Studies*, 9(1), 1-36.
- Kraus, A., H.R. Stoll (1972), "Price Impacts of Block Trading on the New York Stock Exchange", *The Journal of Finance*, 27(3), 569-588.

- Lee, C. M., M. J. Ready (1991), "Inferring Trade Direction from Intraday Data", *The Journal of Finance*, 46(2), 733-746.
- Ren, F., L.X. Zhong (2012), "The Price Impact Asymmetry of Institutional Trading in the Chinese Stock Market", *Physica A: Statistical Mechanics and its Applications*, 391(8), 2667–2677.
- Ryu, D. (2013), "Price Impact Asymmetry of Futures Trades: Trade Direction and Trade Size", *Emerging Markets Review*, 14, 110-130.
- Torre, N.C. (1998), "The Market Impact Problem", *The BARRA Newsletter*, Winter 1998, 165.