UNIWERSYTET EKONOMICZNY W POZNANIU

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# Exit threat and stock liquidity: Evidence from Open-Ended Pension Funds' reform in Poland

Agnieszka Stróżyńska-Szajek, Aleksander Freitag, Szymon Stereńczak

Regionalna Inicjatywa Doskonałości

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# Research problem

**The endogenous nature of the relationship between stock liquidity and corporate governance**

| | | |
|---|---|---|
| Market liquidity as integral to stock markets: A key factor shaping investor behavior and market efficiency. | High stock liquidity enables blockholders to exit if dissatisfied, increasing exit threat (Chen et al., 2020; Edmans et al., 2013). | Exit threat as disciplinary mechanism that pressures executives to align their decisions with shareholder interests (Edmans, 2009). This can enhance stock liquidity. |

**We aim to examine whether an increase in blockholder's exit threat improves stock liquidity**

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# Hypotheses of the study


***H1:*** *An increase in the blockholder threat of exit caused by OFE reform improves stock liquidity.*


***H2:*** *The reform reduced stock liquidity in firms where OFEs are blockholders.*

# Hypotheses of the study

***H1:*** *An increase in the threat of exit by OFE* ***improves*** *stock liquidity.*

***H1a****: The beneficiary effect of an increased exit threat on stock liquidity* ***is more pronounced*** *among companies with* ***multiple OFE blockholdings***.

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# Hypotheses of the study


***H1:*** *An increase in the blockholder threat of exit caused by OFE reform improves stock liquidity.*


***H2:*** *The reform reduced stock liquidity in firms where OFEs are blockholders.*

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# Hypotheses of the study

***H2:*** *The reform reduced stock liquidity in firms where OFEs are blockholders.*

***H2a****: The adverse effect of an increased exit threat on stock liquidity* ***is more pronounced*** *among* ***more informationally-opaque*** *companies.*

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# Methods and data

a quasi-natural experiment from the Open-Ended Pension Funds (OFEs) reform in Poland:
difference-in-differences

2011 - 2016

318 non-financial companies
listed on the Warsaw Stock Exchange (primary listing in the WSE)
throughout 2013 and 2014

S&P Capital IQ database

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# Variables definitions

| | | |
|---|---|---|
| *Stock liquidity (dependent variables)* | *ILLIQ* | the Amihud (2002) illiquidity ratio calculated as an annual average of the absolute value of daily log-return to respective trading volume (in PLN million) |
| | *Turn* | the turnover ratio measured as an annual sum of the unit trading volume relative to the annual average of the outstanding shares |
| | *PQCS* | the Percent Quoted Closing Spread computed based on the bid and ask prices quoted at the end of the day (Chung and Zhang 2014) |
| | *PECS* | the Percent Effective Closing Spread computed based on the mid price quoted at the end of the day and the close price |
| | *FHT* | the Fong, Holden and Trzcinka (2017) spread estimator based on the proportion of zero-return days |
| | *Liu* | Liu's (2006) liquidity measure: turnover adjusted number of zero trading volume days |
| *DiD variables* | *Treatment* | dummy variable that equals 1 if a company has at least 1 blockholder OFE (>5%) and zero otherwise |
| | *After* | dummy variable that equals 1 for observations from years 2014-2016 and 0 otherwise |
| *Control variables* | *lnMV* | the natural logarithm of the market value of equity |
| | *Age* | the logarithm of the number of years since first listing |
| | *Volatility* | a standard deviation of weekly log returns |
| | *Leverage* | total debt scaled by total capital |
| | *BV/MV* | book-to-market ratio |
| | *Tangibility* | net property, plant and equipment scaled by total assets |

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# Variables definitions

| | | |
|---|---|---|
| *Stock liquidity (dependent variables)* | *ILLIQ*<br>*Turn*<br>*PQCS*<br>*PECS*<br>*FHT*<br>*Liu* | log-transformed due to excessive skewness and kurtosis; except *Turn* multiplied by -1 so the higher values denote higher liquidity |
| *DiD variables* | *Treatment* | dummy variable that equals 1 if a company has at least 1 blockholder OFE (>5%) and zero otherwise |
| | *After* | dummy variable that equals 1 for observations from years 2014-2016 and 0 otherwise |
| *Control variables* | *lnMV*<br>*Age*<br>*Volatility*<br>*Leverage*<br>*BV/MV*<br>*Tangibility* | cross-sectionally winsorised at 2.5$^{th}$ and 97.5$^{th}$ percentiles |

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# Descriptive statistics

| Variable | Mean | Std.Dev. | Skewness | Kurtosis | 5th percentile | Median | 95th percentile |
|---|---|---|---|---|---|---|---|
| *ILLIQ* | -1.009 | 3.308 | 0.588 | 0.236 | -5.472 | -1.715 | 5.272 |
| *Turn* | -2.084 | 1.486 | -0.711 | 1.945 | -4.773 | -1.980 | 0.106 |
| *PQCS* | 3.810 | 0.912 | -0.632 | -1.045 | 2.115 | 3.848 | 5.215 |
| *PECS* | 4.512 | 0.931 | -0.609 | -0.940 | 2.754 | 4.559 | 5.956 |
| *FHT* | 4.700 | 1.040 | -0.232 | -0.368 | 2.879 | 4.758 | 6.349 |
| *Liu* | 6.548 | 6.984 | 0.211 | 1.819 | -1.518 | 2.428 | 15.535 |
| *lnMV* | 5.093 | 1.631 | 0.381 | -0.114 | 2.607 | 4.935 | 8.358 |
| *Age* | 1.809 | 0.932 | -1.151 | 1.531 | 0.024 | 1.945 | 2.916 |
| *Volatility* | 0.064 | 0.039 | 2.650 | 9.044 | 0.029 | 0.053 | 0.151 |
| *Leverage* | 0.266 | 0.214 | 0.779 | 0.234 | 0.000 | 0.244 | 0.704 |
| *BV/MV* | 1.133 | 1.082 | 1.207 | 4.002 | 0.082 | 0.880 | 3.443 |
| *Tangibility* | 0.287 | 0.228 | 0.516 | -0.764 | 0.003 | 0.254 | 0.746 |

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# Empirical findings

# Empirical findings

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -1.542*** | -1.997*** | 3.564*** | 4.245*** | -4.399*** | 6.551*** |
| | (4.14) | (16.62) | (36.06) | (43.41) | (30.91) | (7.36) |
| *Treatment* | 1.388** | 0.169 | 0.535*** | 0.554*** | 0.732*** | 0.911 |
| | (3.55) | (1.43) | (4.74) | (4.93) | (6.06) | (1.10) |
| *After* | -0.318 | -0.308** | -0.035 | -0.008 | -0.060 | -1.036 |
| | (1.13) | (3.77) | (0.42) | (0.11) | (0.51) | (1.27) |
| *Treatment*After* | 0.381* | -0.003 | 0.120 | 0.117 | 0.041 | 0.600 |
| | (2.02) | (0.17) | (1.42) | (1.43) | (0.49) | (1.15) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.057 | 0.013 | 0.106 | 0.108 | 0.129 | 0.010 |

# Empirical findings

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -1.542*** | -1.997*** | 3.564*** | 4.245*** | -4.399*** | 6.551*** |
| | (4.14) | (16.62) | (36.06) | (43.41) | (30.91) | (7.36) |
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| *Treatment*After* | 0.381* | -0.003 | 0.120 | 0.117 | 0.041 | 0.600 |
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| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.057 | 0.013 | 0.106 | 0.108 | 0.129 | 0.010 |

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# Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -9.583*** | -3.545*** | 2.353*** | 3.033*** | 2.790*** | -5.822*** |
| | (17.25) | (12.11) | (19.84) | (23.94) | (13.28) | (4.47) |
| *Treatment* | -0.148 | 0.194 | 0.075 | 0.080 | 0.299*** | -0.652 |
| | (0.53) | (1.39) | (1.33) | (1.42) | (4.29) | (0.95) |
| *After* | -0.418* | -0.467** | -0.061 | -0.033 | -0.124 | -1.384 |
| | (2.47) | (3.93) | (1.89) | (0.89) | (1.72) | (1.76) |
| *Treatment*After* | 0.066 | 0.056 | 0.022 | 0.014 | -0.041 | 0.377 |
| | (0.38) | (1.00) | (0.55) | (0.34) | (0.98) | (0.71) |
| *lnMV* | 1.435*** | 0.064 | 0.300*** | 0.307*** | 0.314*** | 1.782*** |
| | (14.37) | (1.35) | (15.91) | (15.91) | (13.34) | (10.93) |
| *Age* | 0.449*** | 0.305** | 0.096** | 0.095** | 0.176** | 0.944** |
| | (4.87) | (3.91) | (3.41) | (3.40) | (3.54) | (3.91) |
| *Volatility* | 2.609 | 7.903*** | -6.023*** | -6.346*** | -2.834* | 23.278** |
| | (1.05) | (8.26) | (8.02) | (7.79) | (2.14) | (3.50) |
| *Leverage* | 0.681 | 0.365 | 0.114 | 0.092 | 0.017 | 1.758 |
| | (1.81) | (1.49) | (1.04) | (0.82) | (0.13) | (1.80) |
| *BV/MV* | 0.333*** | 0.135* | 0.097*** | 0.095*** | 0.099*** | 0.625* |
| | (4.18) | (2.25) | (4.64) | (4.58) | (4.33) | (2.51) |
| *Tangibility* | -0.026 | -0.094 | -0.011 | -0.007 | -0.016 | -0.537 |
| | (0.05) | (0.30) | (0.09) | (0.05) | (0.11) | (0.42) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.505 | 0.093 | 0.526 | 0.536 | 0.427 | 0.163 |

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# Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -9.583*** | -3.545*** | 2.353*** | 3.033*** | 2.790*** | -5.822*** |
| | (17.25) | (12.11) | (19.84) | (23.94) | (13.28) | (4.47) |
| *Treatment* | -0.148 | 0.194 | 0.075 | 0.080 | 0.299*** | -0.652 |
| | (0.53) | (1.39) | (1.33) | (1.42) | (4.29) | (0.95) |
| *After* | -0.418* | -0.467** | -0.061 | -0.033 | -0.124 | -1.384 |
| | (2.47) | (3.93) | (1.89) | (0.89) | (1.72) | (1.76) |
| *Treatment*After* | 0.066 | 0.056 | 0.022 | 0.014 | -0.041 | 0.377 |
| | (0.38) | (1.00) | (0.55) | (0.34) | (0.98) | (0.71) |
| *lnMV* | 1.435*** | 0.064 | 0.300*** | 0.307*** | 0.314*** | 1.782*** |
| | (14.37) | (1.35) | (15.91) | (15.91) | (13.34) | (10.93) |
| *Age* | 0.449*** | 0.305** | 0.096** | 0.095** | 0.176** | 0.944** |
| | (4.87) | (3.91) | (3.41) | (3.40) | (3.54) | (3.91) |
| *Volatility* | 2.609 | 7.903*** | -6.023*** | -6.346*** | -2.834* | 23.278** |
| | (1.05) | (8.26) | (8.02) | (7.79) | (2.14) | (3.50) |
| *Leverage* | 0.681 | 0.365 | 0.114 | 0.092 | 0.017 | 1.758 |
| | (1.81) | (1.49) | (1.04) | (0.82) | (0.13) | (1.80) |
| *BV/MV* | 0.333*** | 0.135* | 0.097*** | 0.095*** | 0.099*** | 0.625* |
| | (4.18) | (2.25) | (4.64) | (4.58) | (4.33) | (2.51) |
| *Tangibility* | -0.026 | -0.094 | -0.011 | -0.007 | -0.016 | -0.537 |
| | (0.05) | (0.30) | (0.09) | (0.05) | (0.11) | (0.42) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.505 | 0.093 | 0.526 | 0.536 | 0.427 | 0.163 |

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# Alternative *Treatment* variable

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# Alternative *Treatment* variable

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -1.243** | -1.957*** | 3.686*** | 4.370*** | 4.548*** | 6.714*** |
| | (3.93) | (20.42) | (46.07) | (54.78) | (38.43) | (8.97) |
| *Treatment2* | 1.339** | 0.149 | 0.492*** | 0.511*** | 0.743*** | 1.017 |
| | (3.52) | (1.45) | (4.62) | (4.83) | (7.15) | (1.42) |
| *After* | -0.277 | -0.332*** | -0.020 | 0.003 | -0.068 | -0.930 |
| | (1.16) | (4.19) | (0.29) | (0.05) | (0.68) | (1.35) |
| *Treatment2*After* | 0.513*** | 0.095*** | 0.151* | 0.157* | 0.099 | 0.657* |
| | (4.08) | (5.51) | (2.04) | (2.18) | (1.83) | (2.55) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.043 | 0.013 | 0.070 | 0.073 | 0.105 | 0.009 |

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# Alternative *Treatment* variable

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -1.243** | -1.957*** | 3.686*** | 4.370*** | 4.548*** | 6.714*** |
| | (3.93) | (20.42) | (46.07) | (54.78) | (38.43) | (8.97) |
| *Treatment2* | 1.339** | 0.149 | 0.492*** | 0.511*** | 0.743*** | 1.017 |
| | (3.52) | (1.45) | (4.62) | (4.83) | (7.15) | (1.42) |
| *After* | -0.277 | -0.332*** | -0.020 | 0.003 | -0.068 | -0.930 |
| | (1.16) | (4.19) | (0.29) | (0.05) | (0.68) | (1.35) |
| *Treatment2*After* | 0.513*** | 0.095*** | 0.151* | 0.157* | 0.099 | 0.657* |
| | (4.08) | (5.51) | (2.04) | (2.18) | (1.83) | (2.55) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.043 | 0.013 | 0.070 | 0.073 | 0.105 | 0.009 |

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# Alternative *Treatment* variable

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -9.576*** | -3.500*** | 2.376*** | 3.059*** | 2.860*** | -5.923*** |
| | (16.81) | (12.17) | (19.57) | (23.76) | (13.96) | (4.76) |
| *Treatment2* | -0.239 | 0.150 | 0.044 | 0.050 | 0.310*** | -0.638 |
| | (0.90) | (1.26) | (0.73) | (0.84) | (4.78) | (1.05) |
| *After* | -0.464** | -0.478*** | -0.074* | -0.050 | -0.156* | -1.337* |
| | (3.48) | (4.47) | (2.51) | (1.51) | (2.32) | (2.03) |
| *Treatment2*After* | 0.328* | 0.135*** | 0.090* | 0.093* | 0.050 | 0.546 |
| | (2.54) | (4.22) | (2.29) | (2.42) | (0.91) | (1.82) |
| *lnMV* | 1.430*** | 0.067 | 0.300*** | 0.307*** | 0.314*** | 1.769*** |
| | (14.85) | (1.51) | (16.33) | (16.36) | (13.54) | (11.06) |
| *Age* | 0.448*** | 0.309** | 0.097** | 0.096** | 0.179** | 0.935** |
| | (4.83) | (3.89) | (3.45) | (3.43) | (3.56) | (3.87) |
| *Volatility* | 2.803 | 7.622*** | -6.125*** | -6.439*** | -3.107* | 23.933** |
| | (1.12) | (7.87) | (8.09) | (7.88) | (2.28) | (3.54) |
| *Leverage* | 0.686 | 0.359 | 0.112 | 0.090 | 0.010 | 1.769 |
| | (1.83) | (1.45) | (1.03) | (0.81) | (0.08) | (1.80) |
| *BV/MV* | 0.333*** | 0.137* | 0.098*** | 0.095*** | 0.102*** | 0.622* |
| | (4.18) | (2.26) | (4.62) | (4.57) | (4.45) | (2.47) |
| *Tangibility* | -0.031 | -0.092 | -0.011 | -0.006 | -0.005 | -0.542 |
| | (0.06) | (0.30) | (0.09) | (0.05) | (0.04) | (0.42) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.505 | 0.093 | 0.526 | 0.536 | 0.429 | 0.163 |

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# Alternative *Treatment* variable

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -9.576*** | -3.500*** | 2.376*** | 3.059*** | 2.860*** | -5.923*** |
| | (16.81) | (12.17) | (19.57) | (23.76) | (13.96) | (4.76) |
| *Treatment2* | -0.239 | 0.150 | 0.044 | 0.050 | 0.310*** | -0.638 |
| | (0.90) | (1.26) | (0.73) | (0.84) | (4.78) | (1.05) |
| *After* | -0.464** | -0.478*** | -0.074* | -0.050 | -0.156* | -1.337* |
| | (3.48) | (4.47) | (2.51) | (1.51) | (2.32) | (2.03) |
| *Treatment2*After* | 0.328* | 0.135*** | 0.090* | 0.093* | 0.050 | 0.546 |
| | (2.54) | (4.22) | (2.29) | (2.42) | (0.91) | (1.82) |
| *lnMV* | 1.430*** | 0.067 | 0.300*** | 0.307*** | 0.314*** | 1.769*** |
| | (14.85) | (1.51) | (16.33) | (16.36) | (13.54) | (11.06) |
| *Age* | 0.448*** | 0.309** | 0.097** | 0.096** | 0.179** | 0.935** |
| | (4.83) | (3.89) | (3.45) | (3.43) | (3.56) | (3.87) |
| *Volatility* | 2.803 | 7.622*** | -6.125*** | -6.439*** | -3.107* | 23.933** |
| | (1.12) | (7.87) | (8.09) | (7.88) | (2.28) | (3.54) |
| *Leverage* | 0.686 | 0.359 | 0.112 | 0.090 | 0.010 | 1.769 |
| | (1.83) | (1.45) | (1.03) | (0.81) | (0.08) | (1.80) |
| *BV/MV* | 0.333*** | 0.137* | 0.098*** | 0.095*** | 0.102*** | 0.622* |
| | (4.18) | (2.26) | (4.62) | (4.57) | (4.45) | (2.47) |
| *Tangibility* | -0.031 | -0.092 | -0.011 | -0.006 | -0.005 | -0.542 |
| | (0.06) | (0.30) | (0.09) | (0.05) | (0.04) | (0.42) |
| No. of observations | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| Adj. $R^2$ | 0.505 | 0.093 | 0.526 | 0.536 | 0.429 | 0.163 |

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# Propensity score matching

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# Propensity score matching

| Panel A: Pre-match and post-match propensity | | |
|---|---|---|
| Variable | Pre-match | Post-match |
| *Const* | -1.125* | 0.728 |
| | (1.80) | (0.75) |
| *PQCS* | -6.137 | -4.169 |
| | (1.33) | (0.46) |
| *InstOwn* | 0.029*** | -0.002 |
| | (6.28) | (0.27) |
| *InsOwn* | 0.003 | -0.006 |
| | (0.71) | (0.94) |
| *lnMV* | 0.124* | -0.028 |
| | (1.85) | (0.26) |
| *Age* | 0.161 | -0.151 |
| | (1.36) | (0.80) |
| *Volatility* | -9.645** | 0.949 |
| | (2.43) | (0.15) |
| *BV/MV* | -0.090* | -0.045 |
| | (1.83) | (0.44) |
| *ROA* | 0.422 | -0.121 |
| | (0.60) | (0.08) |
| Number of observations | 318 | 94 |
| p-value of $\chi^2$ | 0.000 | 0.976 |
| Mc-Fadden R-squared | 0.324 | 0.017 |

Regionalna Inicjatywa Doskonałości

# Propensity score matching

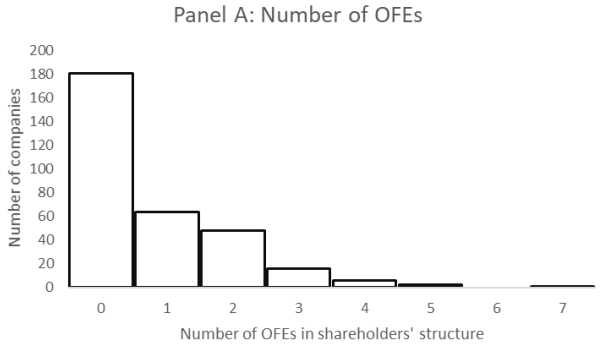
| Panel B: Post-matching differences | | | | |
|---|---|---|---|---|
| Variable | Treatment | Control | Difference | t-Statistic |
| *ILLIQ* | 20.395 | 18.025 | 2.369 | 0.283 |
| *Turn* | 0.316 | 0.372 | -0.057 | 0.500 |
| *PQCS* | 0.021 | 0.024 | -0.003 | 0.705 |
| *PECS* | 0.010 | 0.012 | -0.001 | 0.617 |
| *FHT* | 0.012 | 0.012 | 0.001 | 0.295 |
| *Liu* | 0.785 | 0.778 | 0.007 | 0.022 |
| *InstOwp* | 29.743 | 30.661 | -0.918 | 0.225 |
| *SOE* | 0.085 | 0.106 | -0.021 | 0.324 |
| *InsOwn* | 18.210 | 22.405 | -4.196 | 0.783 |
| *MaxOwn* | 37.914 | 42.946 | -5.032 | 1.165 |
| *HHI_5* | 2113.747 | 2661.675 | -547.929 | 1.490 |
| *HHI_1* | 2147.229 | 2687.450 | -540.221 | 1.475 |
| *lnMV* | 5.566 | 5.475 | 0.091 | 0.262 |
| *Age* | 1.931 | 2.002 | -0.071 | 0.415 |
| *Volatility* | 0.060 | 0.060 | 0.000 | 0.002 |
| *Leverage* | 0.293 | 0.242 | 0.051 | 0.827 |
| *BV/MV* | 1.017 | 1.237 | -0.220 | 0.650 |
| *ROA* | 0.042 | 0.045 | -0.003 | 0.141 |
| *ROE* | 0.055 | 0.114 | -0.059 | 0.945 |

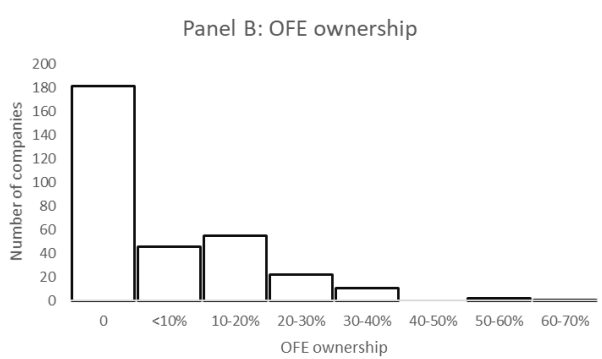
UNIWERSYTET EKONOMICZNY W POZNANIU

# Propensity score matching

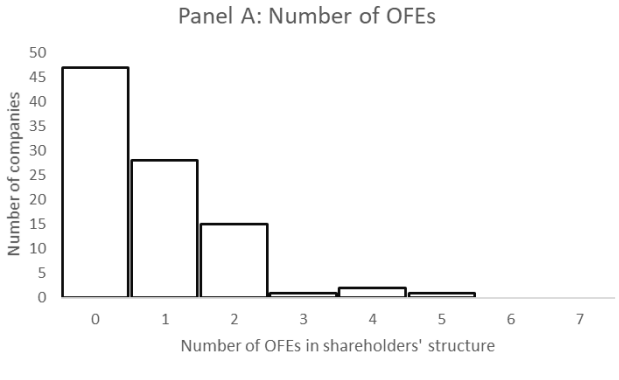
## The distributions of OFEs in shareholders' structure

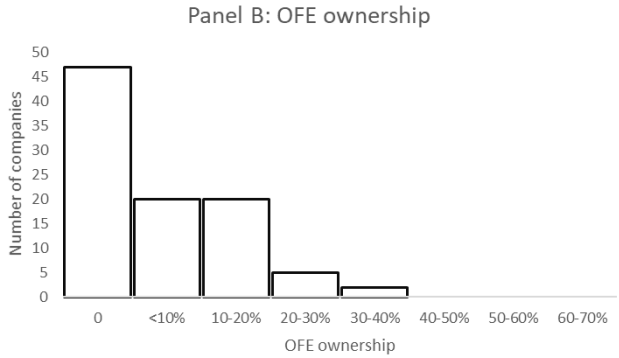
### Pre-match sample




### Post-match sample




Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -0.270 | -1.999*** | 4.027*** | 4.727*** | 4.989*** | 7.861*** |
| | (0.59) | (11.11) | (38.67) | (45.22) | (49.75) | (10.93) |
| *Treatment* | -0.315 | 0.197 | -0.047 | -0.043 | -0.008 | -0.423 |
| | (0.58) | (0.91) | (0.38) | (0.35) | (0.06) | (0.43) |
| *After* | 0.083 | -0.012 | 0.053* | 0.075** | -0.016 | -0.751*** |
| | (1.94) | (0.41) | (2.48) | (3.72) | (0.43) | (5.32) |
| *Treatment*After* | -0.131 | -0.349*** | -0.027 | -0.046 | -0.060 | 0.007 |
| | (1.15) | (7.56) | (0.93) | (1.53) | (1.54) | (0.03) |
| No. of observations | 540 | 540 | 540 | 540 | 540 | 540 |
| Adj. $R^2$ | -0.002 | 0.003 | -0.003 | -0.003 | -0.004 | -0.002 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -0.270 | -1.999*** | 4.027*** | 4.727*** | 4.989*** | 7.861*** |
| | (0.59) | (11.11) | (38.67) | (45.22) | (49.75) | (10.93) |
| *Treatment* | -0.315 | 0.197 | -0.047 | -0.043 | -0.008 | -0.423 |
| | (0.58) | (0.91) | (0.38) | (0.35) | (0.06) | (0.43) |
| *After* | 0.083 | -0.012 | 0.053* | 0.075** | -0.016 | -0.751*** |
| | (1.94) | (0.41) | (2.48) | (3.72) | (0.43) | (5.32) |
| *Treatment*After* | -0.131 | -0.349*** | -0.027 | -0.046 | -0.060 | 0.007 |
| | (1.15) | (7.56) | (0.93) | (1.53) | (1.54) | (0.03) |
| No. of observations | 540 | 540 | 540 | 540 | 540 | 540 |
| Adj. $R^2$ | -0.002 | 0.003 | -0.003 | -0.003 | -0.004 | -0.002 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -10.819*** | -4.065*** | 2.206*** | 2.896*** | 2.894*** | -6.901** |
| | (11.26) | (9.30) | (8.56) | (10.64) | (10.46) | (3.25) |
| *Treatment* | -0.415 | 0.198 | -0.079 | -0.074 | -0.020 | -0.581 |
| | (1.09) | (0.89) | (0.94) | (0.89) | (0.22) | (0.65) |
| *After* | -0.379 | -0.099 | -0.057 | -0.037 | -0.108 | -1.416** |
| | (1.76) | (1.27) | (1.85) | (1.05) | (1.84) | (3.45) |
| *Treatment*After* | 0.036 | -0.279*** | -0.006 | -0.025 | -0.019 | 0.334 |
| | (0.11) | (3.13) | (0.11) | (0.42) | (0.39) | (1.38) |
| *lnMV* | 1.477*** | 0.098 | 0.310*** | 0.314*** | 0.311*** | 1.682*** |
| | (9.51) | (1.36) | (8.83) | (9.22) | (8.68) | (6.74) |
| *Age* | 0.682** | 0.292** | 0.109* | 0.114* | 0.119* | 1.251* |
| | (3.41) | (2.68) | (2.19) | (2.31) | (1.97) | (2.13) |
| *Volatility* | 19.729** | 17.381*** | -1.749 | -1.750 | 2.956 | 54.499** |
| | (3.18) | (5.19) | (0.79) | (0.72) | (1.60) | (3.60) |
| *Leverage* | 0.906 | 0.125 | 0.313 | 0.272 | -0.312 | 2.528 |
| | (1.19) | (0.21) | (1.54) | (1.37) | (1.91) | (1.06) |
| *BV/MV* | 0.119 | 0.045 | 0.036 | 0.032 | 0.112 | 0.204 |
| | (0.80) | (0.35) | (0.90) | (0.85) | (1.87) | (0.52) |
| *Tangibility* | 0.456 | -0.115 | -0.013 | -0.019 | 0.150 | -0.636 |
| | (0.46) | (0.24) | (0.05) | (0.08) | (0.49) | (0.26) |
| No. of observations | 540 | 540 | 540 | 540 | 540 | 540 |
| Adj. $R^2$ | 0.486 | 0.117 | 0.418 | 0.421 | 0.307 | 0.162 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -10.819*** | -4.065*** | 2.206*** | 2.896*** | 2.894*** | -6.901** |
| | (11.26) | (9.30) | (8.56) | (10.64) | (10.46) | (3.25) |
| *Treatment* | -0.415 | 0.198 | -0.079 | -0.074 | -0.020 | -0.581 |
| | (1.09) | (0.89) | (0.94) | (0.89) | (0.22) | (0.65) |
| *After* | -0.379 | -0.099 | -0.057 | -0.037 | -0.108 | -1.416** |
| | (1.76) | (1.27) | (1.85) | (1.05) | (1.84) | (3.45) |
| *Treatment*After* | 0.036 | -0.279*** | -0.006 | -0.025 | -0.019 | 0.334 |
| | (0.11) | (3.13) | (0.11) | (0.42) | (0.39) | (1.38) |
| *lnMV* | 1.477*** | 0.098 | 0.310*** | 0.314*** | 0.311*** | 1.682*** |
| | (9.51) | (1.36) | (8.83) | (9.22) | (8.68) | (6.74) |
| *Age* | 0.682** | 0.292** | 0.109* | 0.114* | 0.119* | 1.251* |
| | (3.41) | (2.68) | (2.19) | (2.31) | (1.97) | (2.13) |
| *Volatility* | 19.729** | 17.381*** | -1.749 | -1.750 | 2.956 | 54.499** |
| | (3.18) | (5.19) | (0.79) | (0.72) | (1.60) | (3.60) |
| *Leverage* | 0.906 | 0.125 | 0.313 | 0.272 | -0.312 | 2.528 |
| | (1.19) | (0.21) | (1.54) | (1.37) | (1.91) | (1.06) |
| *BV/MV* | 0.119 | 0.045 | 0.036 | 0.032 | 0.112 | 0.204 |
| | (0.80) | (0.35) | (0.90) | (0.85) | (1.87) | (0.52) |
| *Tangibility* | 0.456 | -0.115 | -0.013 | -0.019 | 0.150 | -0.636 |
| | (0.46) | (0.24) | (0.05) | (0.08) | (0.49) | (0.26) |
| No. of observations | 540 | 540 | 540 | 540 | 540 | 540 |
| Adj. $R^2$ | 0.486 | 0.117 | 0.418 | 0.421 | 0.307 | 0.162 |

Regionalna Inicjatywa Doskonałości

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# Propensity score matching - *Treatment2*

Regionalna Inicjatywa Doskonałości

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# Propensity score matching - *Treatment2*

| Panel A: Pre-match and post-match propensity | | |
|---|---|---|
| Variable | Pre-match | Post-match |
| *Const* | -2.231*** | 0.550 |
| | (2.75) | (0.41) |
| *PQCS* | -9.234 | -7.004 |
| | (1.19) | (0.53) |
| *InstOwn* | 0.038*** | 0.000 |
| | (7.09) | (0.01) |
| *InsOwn* | 0.003 | 0.003 |
| | (0.559) | (0.33) |
| *lnMV* | 0.134* | 0.007 |
| | (1.67) | (0.05) |
| *Age* | 0.068 | -0.191 |
| | (0.49) | (0.96) |
| *Volatility* | -6.517 | -0.261 |
| | (1.23) | (0.029) |
| *BV/MV* | -0.096 | 0.052 |
| | (1.39) | (0.53) |
| *ROA* | -0.664 | -3.369 |
| | (0.52) | (1.15) |
| Number of observations | 318 | 72 |
| p-value of $\chi^2$ | 0.000 | 0.943 |
| Mc-Fadden R-squared | 0.364 | 0.029 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Propensity score matching - *Treatment2*

Panel B: Post-matching differences

| Variable | Treatment | Control | Difference | t-Statistic |
|---|---|---|---|---|
| *ILLIQ* | 13.217 | 13.433 | -0.217 | 0.036 |
| *Turn* | 0.186 | 0.376 | -0.190 | 1.659 |
| *PQCS* | 0.020 | 0.021 | -0.000 | 0.083 |
| *PECS* | 0.010 | 0.010 | 0.000 | 0.187 |
| *FHT* | 0.008 | 0.010 | -0.001 | 1.011 |
| *Liu* | 0.715 | 0.563 | 0.152 | 0.547 |
| *InstOwp* | 41.447 | 40.442 | 1.005 | 0.237 |
| *SOE* | 0.056 | 0.056 | 0.000 | 0.000 |
| *InsOwn* | 17.701 | 18.267 | -0.566 | 0.132 |
| *MaxOwn* | 34.502 | 40.173 | -5.671 | 1.358 |
| *HHI_5* | 1893.705 | 2418.034 | -524.329 | 1.475 |
| *HHI_1* | 1928.417 | 2454.532 | -526.115 | 1.491 |
| *lnMV* | 5.720 | 5.750 | -0.030 | 0.090 |
| *Age* | 1.969 | 2.070 | -0.101 | 0.566 |
| *Volatility* | 0.055 | 0.054 | 0.001 | 0.163 |
| *Leverage* | 0.238 | 0.236 | 0.002 | 0.036 |
| *BV/MV* | 0.936 | 0.545 | 0.391 | 0.669 |
| *ROA* | 0.034 | 0.053 | -0.019 | 1.209 |
| *ROE* | 0.056 | 0.085 | -0.029 | 0.589 |

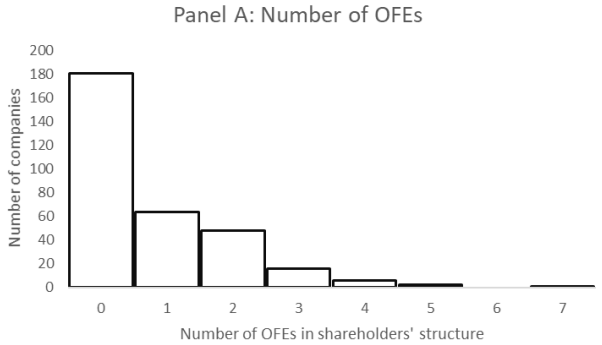
Regionalna Inicjatywa Doskonałości

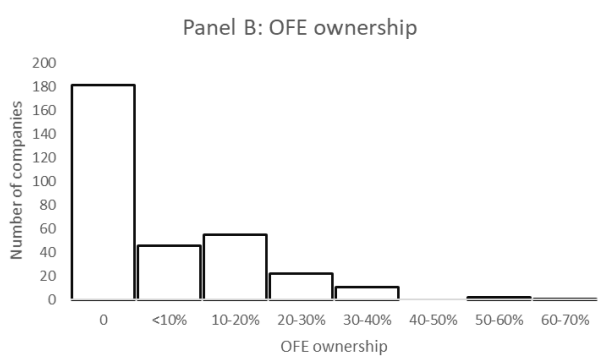
UNIWERSYTET EKONOMICZNY W POZNANIU

# Propensity score matching

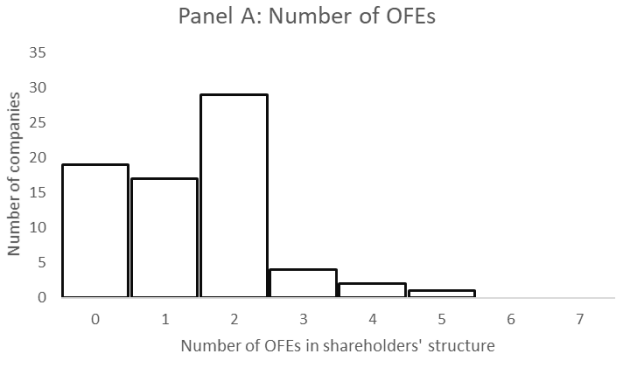
## The distributions of OFEs in shareholders' structure

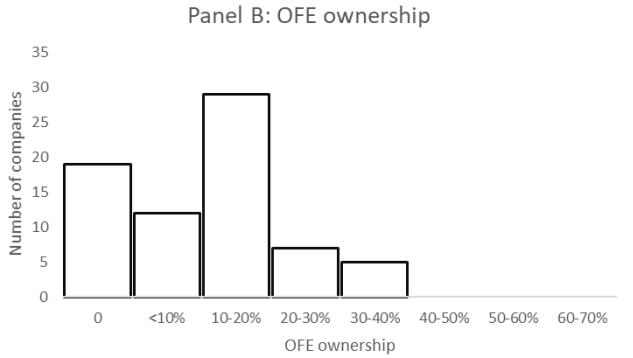
### Pre-match sample




### Post-match sample




Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample and *Treatment2*

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -0.095 | -1.872*** | 4.097*** | 4.795*** | 5.170*** | 7.531*** |
| | (0.20) | (11.10) | (35.37) | (41.61) | (43.85) | (7.34) |
| *Treatment* | -0.587 | -0.104 | -0.089 | -0.083 | -0.017 | -1.420 |
| | (0.95) | (0.54) | (0.63) | (0.60) | (0.12) | (1.26) |
| *After* | -0.338*** | -0.390*** | -0.028 | 0.003 | -0.228*** | -1.420*** |
| | (3.99) | (8.10) | (1.62) | (0.21) | (6.05) | (4.22) |
| *Treatment*After* | 0.374** | 0.244*** | 0.152*** | 0.146*** | 0.192*** | 1.009** |
| | (2.98) | (4.72) | (6.59) | (5.97) | (6.51) | (3.51) |
| No. of observations | 413 | 413 | 413 | 413 | 413 | 413 |
| Adj. $R^2$ | -0.002 | 0.009 | -0.003 | -0.002 | 0.007 | 0.003 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample and *Treatment2*

## Empirical findings cont.

| Panel A: No control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -0.095 | -1.872*** | 4.097*** | 4.795*** | 5.170*** | 7.531*** |
| | (0.20) | (11.10) | (35.37) | (41.61) | (43.85) | (7.34) |
| *Treatment* | -0.587 | -0.104 | -0.089 | -0.083 | -0.017 | -1.420 |
| | (0.95) | (0.54) | (0.63) | (0.60) | (0.12) | (1.26) |
| *After* | -0.338*** | -0.390*** | -0.028 | 0.003 | -0.228*** | -1.420*** |
| | (3.99) | (8.10) | (1.62) | (0.21) | (6.05) | (4.22) |
| *Treatment*After* | 0.374** | 0.244*** | 0.152*** | 0.146*** | 0.192*** | 1.009** |
| | (2.98) | (4.72) | (6.59) | (5.97) | (6.51) | (3.51) |
| No. of observations | 413 | 413 | 413 | 413 | 413 | 413 |
| Adj. $R^2$ | -0.002 | 0.009 | -0.003 | -0.002 | 0.007 | 0.003 |

Regionalna Inicjatywa Doskonałości

UNIWERSYTET EKONOMICZNY W POZNANIU

# Matched sample and *Treatment2*

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -11.546*** | -4.078*** | 2.039*** | 2.741*** | 2.727*** | -8.247** |
| | (10.91) | (6.92) | (6.73) | (10.27) | (10.14) | (3.46) |
| *Treatment* | -0.723* | -0.082 | -0.124 | -0.116 | -0.009 | -1.619 |
| | (2.55) | (0.47) | (1.67) | (1.59) | (0.09) | (1.91) |
| *After* | -0.518** | -0.418*** | -0.081** | -0.054 | -0.295*** | -1.495** |
| | (3.22) | (5.41) | (2.65) | (1.34) | (4.89) | (2.90) |
| *Treatment*After* | 0.372 | 0.240** | 0.130*** | 0.122** | 0.185** | 1.037 |
| | (1.56) | (2.78) | (4.15) | (3.25) | (3.08) | (1.23) |
| *lnMV* | 1.702*** | 0.181* | 0.330*** | 0.332*** | 0.311*** | 2.281*** |
| | (9.64) | (2.31) | (8.02) | (8.65) | (8.29) | (7.30) |
| *Age* | 0.392* | 0.176 | 0.077 | 0.088* | 0.204** | 0.257 |
| | (2.56) | (1.80) | (1.94) | (2.30) | (2.67) | (0.59) |
| *Volatility* | 10.316 | 12.542* | -3.629 | -3.964 | 4.722* | 34.577* |
| | (1.78) | (2.37) | (1.31) | (1.53) | (1.96) | (2.25) |
| *Leverage* | 2.091* | 0.811 | 0.747** | 0.707** | 0.204 | 4.925* |
| | (2.28) | (1.65) | (3.17) | (3.14) | (0.84) | (2.36) |
| *BV/MV* | 0.392* | 0.068 | 0.092* | 0.090* | 0.082 | 0.499 |
| | (2.02) | (0.51) | (2.37) | (2.26) | (1.46) | (0.91) |
| *Tangibility* | -0.242 | -0.166 | 0.123 | 0.100 | -0.117 | -2.653 |
| | (0.28) | (0.40) | (0.66) | (0.53) | (0.41) | (1.28) |
| No. of observations | 413 | 413 | 413 | 413 | 413 | 413 |
| Adj. $R^2$ | 0.583 | 0.131 | 0.520 | 0.533 | 0.408 | 0.241 |

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# Matched sample and *Treatment2*

## Empirical findings cont.

| Panel B: Control variables | | | | | | |
|---|---|---|---|---|---|---|
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| *Dependent variable* | *lnILLIQ* | *lnTurn* | *lnPQCS* | *lnPECS* | *lnFHT* | *lnLiu* |
| *const* | -11.546*** | -4.078*** | 2.039*** | 2.741*** | 2.727*** | -8.247** |
| | (10.91) | (6.92) | (6.73) | (10.27) | (10.14) | (3.46) |
| *Treatment* | -0.723* | -0.082 | -0.124 | -0.116 | -0.009 | -1.619 |
| | (2.55) | (0.47) | (1.67) | (1.59) | (0.09) | (1.91) |
| *After* | -0.518** | -0.418*** | -0.081** | -0.054 | -0.295*** | -1.495** |
| | (3.22) | (5.41) | (2.65) | (1.34) | (4.89) | (2.90) |
| *Treatment*After* | 0.372 | 0.240** | 0.130*** | 0.122** | 0.185** | 1.037 |
| | (1.56) | (2.78) | (4.15) | (3.25) | (3.08) | (1.23) |
| *lnMV* | 1.702*** | 0.181* | 0.330*** | 0.332*** | 0.311*** | 2.281*** |
| | (9.64) | (2.31) | (8.02) | (8.65) | (8.29) | (7.30) |
| *Age* | 0.392* | 0.176 | 0.077 | 0.088* | 0.204** | 0.257 |
| | (2.56) | (1.80) | (1.94) | (2.30) | (2.67) | (0.59) |
| *Volatility* | 10.316 | 12.542* | -3.629 | -3.964 | 4.722* | 34.577* |
| | (1.78) | (2.37) | (1.31) | (1.53) | (1.96) | (2.25) |
| *Leverage* | 2.091* | 0.811 | 0.747** | 0.707** | 0.204 | 4.925* |
| | (2.28) | (1.65) | (3.17) | (3.14) | (0.84) | (2.36) |
| *BV/MV* | 0.392* | 0.068 | 0.092* | 0.090* | 0.082 | 0.499 |
| | (2.02) | (0.51) | (2.37) | (2.26) | (1.46) | (0.91) |
| *Tangibility* | -0.242 | -0.166 | 0.123 | 0.100 | -0.117 | -2.653 |
| | (0.28) | (0.40) | (0.66) | (0.53) | (0.41) | (1.28) |
| No. of observations | 413 | 413 | 413 | 413 | 413 | 413 |
| Adj. $R^2$ | 0.583 | 0.131 | 0.520 | 0.533 | 0.408 | 0.241 |

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# Main conclusions

What we found:

- **No liquidity effect** for firms with a **single OFE blockholder** — the reform had no consistent impact on this group.
- **Liquidity improved** in firms with **multiple OFE blockholders**, likely due to a stronger and more credible exit threat.

What it means:

- There is **no uniform liquidity effect** of institutional ownership.
- **The intensity** of institutional engagement matters.
- Liquidity improvements are **more likely** when exit threat is **credible and stronger**.

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# Future research agenda

What's next:

- Heterogeneity of the effect of the increased exit threat on stock liquidity - firms with different levels of agency problems and information asymmetry.
- Parallel trends assumption.
- Heckman self-selection model (?).
- ?

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Thank you for your attention!

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