Internet Appendix for "Quantitative Easing and Equity Prices: Evidence from the ETF Program of the Bank of Japan"

Andrea Barbon and Virginia Gianinazzi *

I Model Implied Price Paths

I.I Simulation Results

This section presents simulation results for the price path implied by the model for the case where $\lambda_t \equiv 1$, and for a more general case of λ_t increasing in t. The latter case corresponds to the representative agent gradually revising upward her initial expectation about the size of the program.

We simulate the model for two stocks available in equal supply $Q = (10, 10)'$. We set the variance of dividend innovations to $\sigma = 0.0075$ for both stocks and we assume a correlation coefficient of $\rho = 0.25$. The asset purchase program of the central bank is announced at $t = 1$ with total asset purchases corresponding to $Mq = (2, 0.5)'$, with $M = 120$. Under these assumptions, the model predicts an aggregate policy price impact $\pi = (0.0159, 0.0075)$ by the end of the policy horizon.

In general, the effect of the policy can be decomposed into two components: the initial price jump and the subsequent drift. The relative magnitude of these two components depends on the choices of the risk-free rate and the dynamics of λ_t.

When $\lambda_t \equiv 1$, the relative importance of these two components depends only on the risk free rate. The higher the risk free, the smaller the initial jump and the more pronounced the drift. This can be seen in Figure I, which plots model implied price paths for different choices of the risk free rate.

*Andrea Barbon (andrea.barbon@usi.ch) and Virginia Gianinazzi (virginia.gianinazzi@usi.ch) are with USI Lugano and the Swiss Finance Institute. All errors are our own.

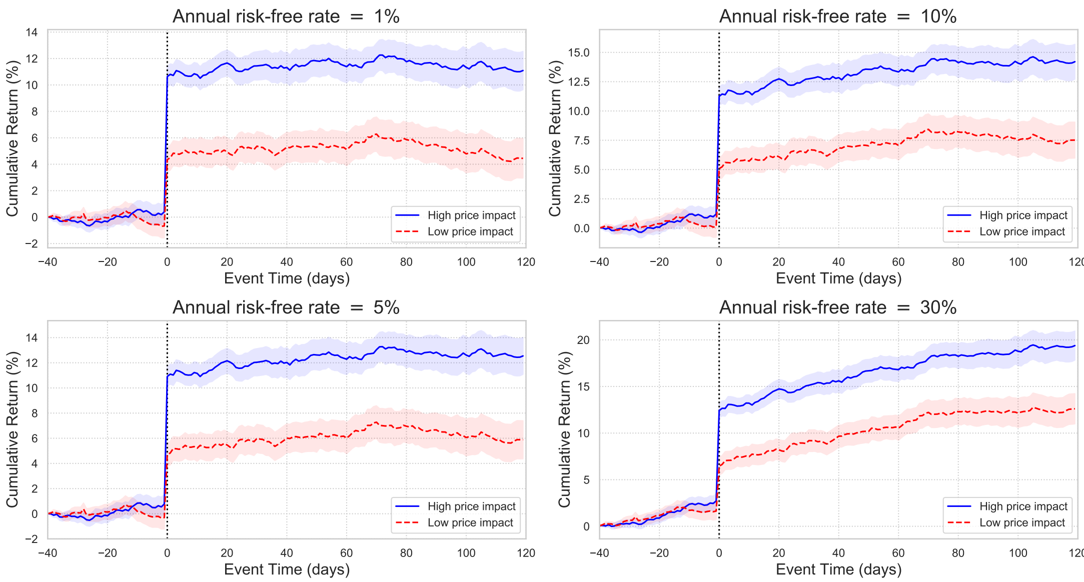


Figure I: Simulation results for constant beliefs and different values of the risk free rate. This figure plots cumulative returns around the policy announcement from model simulations at different values of the risk free rate and for $\lambda_t = 1 \; \forall t$. From the top-left to bottom-right panels, the annual risk free rate is set at 1%, 5%, 10% and 30% to show how this affects the magnitude of the event jump and of the post-event drift.

We then simulate the model for different time paths of investors beliefs about the size of the purchase program, parametrized by a family of logistic functions:

$$\tilde{B} = -\log(1/B - 1), \qquad \lambda_t = \frac{1}{1 + \exp(-\tilde{B} - St)}$$

where B and S parametrize two key characteristics of the beliefs dynamics. Notice that this parametrization implies $\lambda_t \in (0, 1)$, since we want to restrict to belief dynamics corresponding to an under-reaction to the policy announcement. B represents the magnitude of the initial under-reaction and S controls the speed with which the representative agent updates this probability as the program is carried out. Panel A of Figure II plots the dynamics of λ for different choices of the parameters B and S. Panel B plots the simulated price path for the corresponding parameter choice. We see that the bottom left panel produces the combination of jump and drift that is closer to what we observe in the data.

I.II Magnitude of Residual Duration: Analytical Proof

Figure I shows that for realistic values of the risk free rate (less than 5% annually) the drift component is negligible, i.e. it is at least one order of magnitude smaller than the price change on the event day. Intuitively, when discount rates are low the timing of purchases matters less and announced purchases in the future are impounded into prices as soon as they are announced. The following Proposition 1 proves this analytically.

Proposition 1. *Assume $\lambda_t = 1\ \forall t$. For sufficiently small values of the risk-free rate, the post-event price adjustments are at least one order of magnitude smaller than the initial price jump at the announcement day.*

Proof. Recall equations (11) and (12), describing the price jump at the announcement and the subsequent price adjustments, respectively

$$\begin{aligned} p_1 - p_0 &= \frac{1}{r}\left(\varepsilon_1 + \gamma V(Mq - \varphi(1)q)\right) && \text{(i)} \\ p_{t+1} - p_t &= \frac{1}{r}\left(\varepsilon_{t+1} - \gamma V(\varphi(t+1) - \varphi(t))q\right), \qquad t = 1, \dots M && \text{(ii)} \end{aligned}$$

where $M \in \mathbb{N}$ is the duration of the program and $\varphi(t)$, defined by

$$\varphi(t) = \frac{r}{1+r} \sum_{i=0}^{M-t-1} \frac{(M-t-i)}{(1+r)^i} \tag{iii}$$

is a non-stochastic function of time representing the residual duration of the announced purchases. The price jump component is thus proportional to $M - \varphi(1)$, while the subsequent adjustments are proportional to $\varphi(t) - \varphi(t+1)$ for $t = 1, \dots, M$. Choose a natural number $k > 0$ such that the risk-free rate r is bounded by $(kM-1)^{-1}$. This is equivalent to

$$\begin{aligned} r < \frac{1}{kM-1} \quad &\Longleftrightarrow \quad kMr < r + 1 && \text{(iv)} \\ &\Longleftrightarrow \quad kM^2 \frac{r}{1+r} < M && \text{(v)} \end{aligned}$$

Notice that the definition of $\varphi(t)$ immediately implies that

$$\varphi(1) < \varphi(t) \quad \forall t > 1 \tag{vi}$$

and

$$\varphi(1) = \frac{r}{1+r} \sum_{i=0}^{M-2} \frac{M-1-i}{(1+r)^i} < \frac{r}{1+r} M^2 \tag{vii}$$

therefore we conclude that for $r < (kM-1)^{-1}$ we have

$$k\varphi(t) < k\varphi(1) < kM^2 \frac{r}{1+r} < M \tag{viii}$$

The definition of φ also implies that $\varphi(t) - \varphi(t+1) < \varphi(1)$ for $t = 1, \dots, M$, so using equation (viii) we find

$$\varphi(1) + \varphi(t) - \varphi(t+1) < 2\varphi(1) < \frac{2M}{k} \tag{ix}$$

which in turn implies that

$$\varphi(t) - \varphi(t+1) < \frac{2M}{k} - \varphi(1) < \frac{2}{k}(M - \varphi(1)) \tag{x}$$

Hence $k = 20$ is enough to ensure that the post-event price adjustments are at least an order of magnitude smaller than the initial price jump. $\square$

Numerically, assuming a duration of the policy of 2 years ($M = 504$), the bound $r < (kM-1)^{-1}$ for $k = 20$ amounts to the requirement that $r < 0.0001$, corresponding to an annual risk-free rate of 2.5%. This requirement is widely satisfied during our sample period, characterized by interest rates at or below zero.

II Relaxing Market Segmentation

In Section 5.4 we use the portfolio balance effect estimated from cross-sectional regressions to derive an estimate of the aggregate effect at the market-level. As we explain, this back-of-the-envelope calculation is derived under the assumption that the representative agent invests the proceedings from the sale of the ETF shares at the constant risk-free rate. In this section we relax this assumption and we investigate how this impacts our estimate of the aggregate portfolio balance effect and thus of the demand elasticity.

Consider an extension of the model described in Section 3 that includes a non-Japanese equity security S into which the representative agent re-invests a fraction $F \in [0, 1]$ of the proceeds from the sale of the stocks. Let σ_S be the variance of S and η be the n-dimensional vector of covariances of this security with the stocks in the market. The entries of η are therefore given by

$$\eta_i = \sigma_S \sigma_i \rho_i, \qquad i = 1, \dots, n \tag{xi}$$

where the subscript i indicates a stock in the Japanese equity market. For simplicity we normalize the quantity bought by the central bank to one, i.e. $\sum_i u_i = 1$.

From our theoretical framework it follows that the expected impact of the asset purchase program on stock returns is proportional to[1]

[1] When we write it in this way, equation (xii) slightly abuses the notation of the model since, if we interpret it literally, F stands for a change in the quantity of security S available to the market, just as u represent the change in the quantity of stocks induced by the purchase program. This leads to inconsistent predictions about the policy impact on the price of security S, but creates no issues for what we want to do here, namely to derive the implications of the reinvestment in security S for the impact on equity prices. To recover internal consistency, suppose that, instead of exchanging equities for cash, the central banks issues a claim S with the properties described above.

$$\begin{pmatrix} \Sigma & \eta \\ \eta & \sigma_S^2 \end{pmatrix} \begin{pmatrix} u \\ -F \end{pmatrix} = \begin{pmatrix} \Sigma u - F\eta \\ \eta' u - F\sigma_S^2 \end{pmatrix} = \begin{pmatrix} \pi - F\eta \\ \eta' u - F\sigma_S^2 \end{pmatrix} \cong \begin{pmatrix} \pi^* \\ \pi^{non-equity} \end{pmatrix} \tag{xii}$$

Equation (xii) shows that the aggregate effect of the policy on the equity market should be computed as a function of $\pi^* = \pi - F\eta$, yielding

$$\hat{R} = \beta \sum_i \omega_i \pi_i^* \tag{xiii}$$

where we suppress the subscript H in the notation. It is easy to see that $\pi^* = \pi$ if and only if the new asset S has zero correlation with all the stocks or the re-invested fraction F is equal to zero.

We now derive the implications of wrongly assuming $F = 0$. Let the theoretical data generating process of stock returns be given by

$$R_i = \beta \pi_i^* + \epsilon_i \tag{xiv}$$

In Section 5.4 we estimate β from the following regression of returns on π

$$R_i = \beta \pi + e_i \tag{xv}$$

from which we obtain

$$\hat{\beta} = \frac{\text{Cov}(R, \pi)}{\text{Var}(\pi)} = \frac{\text{Cov}(\beta\pi^* + \epsilon, \pi)}{\text{Var}(\pi)} = \beta \frac{\text{Cov}(\pi^*, \pi)}{\text{Var}(\pi)} = \beta \left(1 - \frac{\text{Cov}(\eta, \pi)}{\text{Var}(\pi)}\right) \tag{xvi}$$

We then use the estimated $\hat{\beta}$ to derive the aggregate effect

$$\hat{y} = \hat{\beta} \sum_i \omega_i \pi_i \tag{xvii}$$

Failing to account for the potential re-investment into the new asset S affects our estimate of the aggregate effect both directly through $\pi \neq \pi^*$ as well as indirectly through the estimate of $\hat{\beta} \neq \beta$. More precisely, the bias in our estimate is given by

$$\begin{aligned} \hat{y} - y &= \hat{\beta} \sum_i \omega_i \pi_i - \beta \sum_i \omega_i \pi_i^* && \text{(xviii)} \\ &= \beta \left(\sum_i w_i \left(F\eta_i - \frac{\text{Cov}(\eta, \pi)}{\text{Var}(\pi)} \pi_i \right) \right) && \text{(xix)} \end{aligned}$$

From the above expression it can be shown that the magnitude of the bias depends on (i) the covariance between η and π, (ii) the vector of market weights w and (iii) the degree of market segmentation $1-F$. Because the vector η depends on the unobservable asset S, w has a specific empirical shape and F is unknown, the sign and magnitude of the bias cannot be determined in general from a theoretical argument.

We thus run simulations for different values of F to numerically estimate the likely direction and magnitude of the bias. In a first set of simulations we assume the asset S to be the S&P 500. In a second exercise we explore how the degree and direction of the bias depends on the replacement asset, considering Japanese and US Government Bonds as alternatives.

Each simulation iteration for a fixed F follows the following procedure:

1. Compute η as the covariance between each stock and the replacement asset, using daily returns from a 2-years window ending ten days before the BOJ announcement.
2. Compute $\pi^* = \pi - \eta(\sum_i u_i)F$, where π is the vector used in our empirical analysis
3. Simulate stock returns as $R_i = \beta^* \pi_i^* + \varepsilon_i$, where the *true* β^* is a random number in the interval $[10, 50]$ and the noise terms ε_i are sampled from the error terms of our baseline cross-sectional regression of Section 5.
4. Estimate $\hat{\beta}$ from the regression $R_i = \beta\pi_i + e_i$
5. Compute the estimated aggregate effect $\hat{y}$ and the *true* one y as

$$\hat{y} = \hat{\beta} \sum_i w_i \pi_i \qquad \text{and} \qquad y = \beta^* \sum_i w_i \pi_i^* \tag{xx}$$

6. Compute the bias as a percentage of the real effect

$$\text{Bias} = \frac{\hat{y} - y}{\mid y \mid} \times 100 \tag{xxi}$$

The results from the first set of simulations, summarized in Table I, show that our methodology is likely to over-estimate the real aggregate effect of the policy. As expected, the magnitude of the bias decrease monotonically with the the degree of market segmentation $1-F$ and converges to zero in the case of complete market segmentation ($F = 0$). Importantly we notice that the magnitude of the bias is reasonably small, averaging to at most 10% relative to the real magnitude of the effect. These results suggest that, assuming investors are using the S&P 500 as replacement asset, our methodology can be considered as a reasonably tight upper bound for the true effect of the policy.

In the second round of simulations we assume full re-investment of the proceedings from the BOJ purchases, i.e we fix the fraction of re-invested capital to be $F \equiv 1$, but we consider alternative replacement assets. We take into consideration (i) 10-years Japanese Government Bonds (JGB) and (ii) 10-years US Treasuries. Results, reported in Table I, show that the

Panel A: Different fraction of re-invested capital (S = S&P500)

Fraction of cash re-invested	Real Beta on π	Estimated Beta on π	Estimation Error
25%	30.14	31.03	3.01 %
50%	30.00	31.79	6.14 %
75%	29.87	32.54	9.19 %
100%	30.34	33.97	12.22 %

Panel B: Different re-investment assets (F = 1)

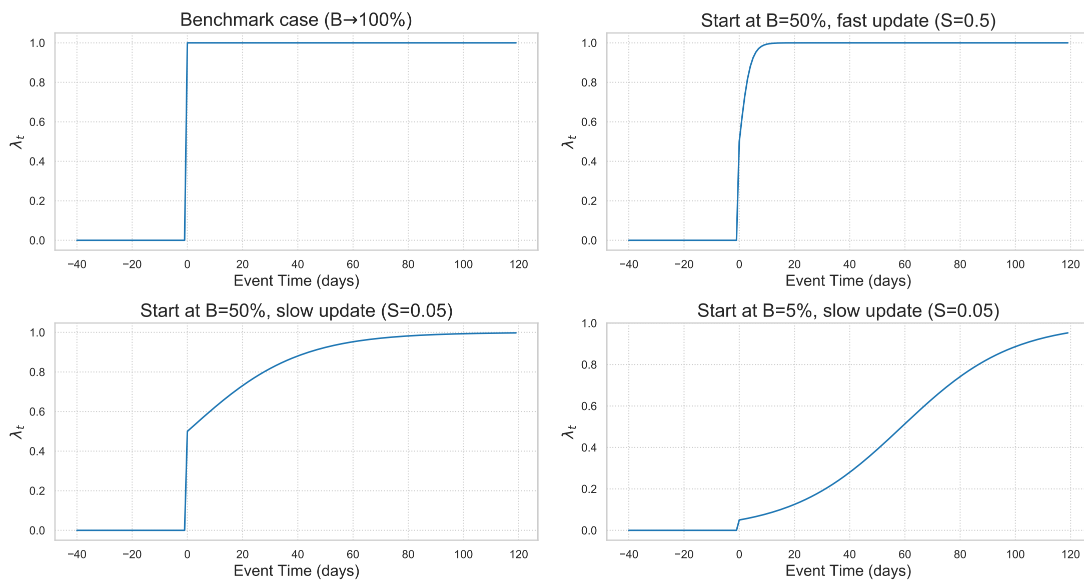
Replacement Asset	Real Beta on π	Estimated Beta on π	Estimation Error
JGB	29.69	26.18	-12.69 %
USB	30.69	29.53	-2.35 %
S&P	30.34	33.97	12.22 %

Table I: Impact of the market segmentation assumption. The table reports the impact of different assumptions about how the agent reinvests the proceeds from the sale of the stocks to the central bank on the estimated aggregate effects of the policy. Results are derived from simulations of the extended version of the model that we derive in Appendix II. Panel A reports results derived under the assumption that agents reinvest the proceeds in the S&P500 for different values of F, the fraction of cash re-invested. Panel B assumes $F = 1$ and derives the estimation error for different choices of the reinvestment asset S, namely Japanese government bonds (JGB) and US Treasuries.

direction of the estimation bias is the opposite when taking bonds as the replacement asset. When S is assumed to be JGBs, the our methodology is under-estimating the effect of the policy. This is consistent with the intuition that government bonds serve as a good hedging for an equity investors. Hence, taking the hypothetical rebalancing toward bonds into account uncovers a more pronounced portfolio balancing effect.

A similar conclusion applies to the case in which S represents US treasuries. The degree of under-estimation is lower though, consistent with the intuition that US treasuries are less effective as a hedge relative to their Japanese counterparts.

Panel A: Functional forms for λ



Panel B: Simulated Price Paths

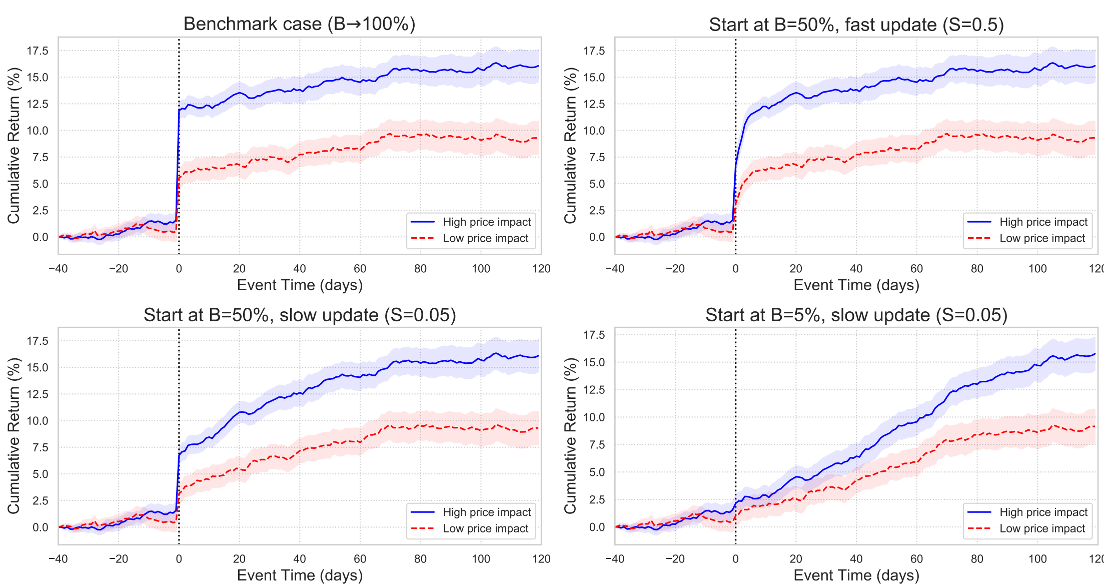


Figure II: Simulation results for time-varying beliefs. This figure presents simulated price paths under different assumptions of investors' beliefs about the size of the program. Panel A plots the time dynamics of the function λ for different choices of the parameters B and S of the logistic function. Panel B presents simulation results. The annual risk free rate is set at 5%.

III Additional Figures and Tables

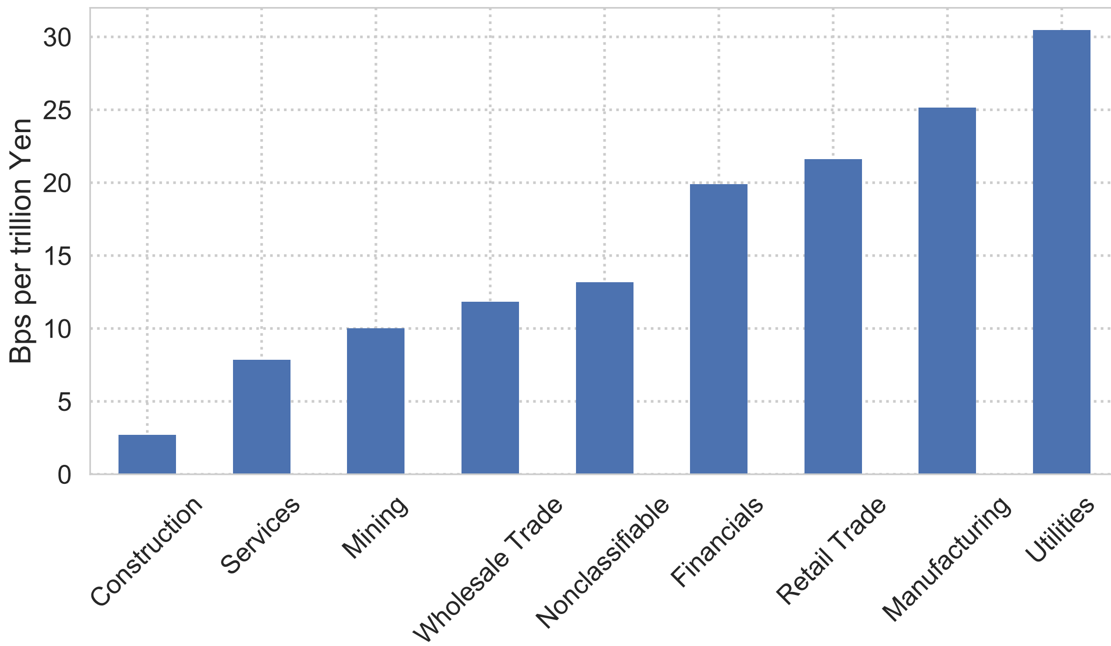


Figure III: Portfolio Balance Effect across Industries This figure shows the estimated portfolio balance impact of the policy, expressed in basis points per trillion Yen, computed separately for each sector.

	Mkt Cap (Bn ¥)			Mkt Beta			Forex Beta			Mkt Leverage (%)			Market to Book		
	Mean	SD	Med	Mean	SD	Med	Mean	SD	Med	Mean	SD	Med	Mean	SD	Med
As of 2013:															
High π	808.4	1643.5	297.8	1.04	0.24	1.03	0.00	0.12	-0.01	26.4	22.4	21.6	1.2	0.5	1.1
Medium-high π	118.3	195.4	53.2	0.79	0.27	0.78	-0.03	0.11	-0.04	24.1	22.8	17.2	1.2	2.0	1.0
Medium-low π	46.3	69.7	25.4	0.75	0.31	0.72	-0.06	0.14	-0.07	25.9	23.3	20.0	1.1	0.8	1.0
Low π	30.8	55.7	17.7	0.90	0.32	0.90	-0.07	0.16	-0.06	25.7	22.6	21.1	1.4	1.3	1.0
As of 2015:															
High π	943.1	1822.3	391.3	1.00	0.18	1.01	0.00	0.13	-0.01	23.9	22.7	18.1	1.4	0.9	1.1
Medium-high π	134.8	219.2	53.7	0.84	0.22	0.85	-0.04	0.12	-0.05	23.3	22.6	17.9	1.2	0.8	1.0
Medium-low π	66.2	110.1	30.0	0.81	0.23	0.82	-0.05	0.14	-0.06	24.5	22.6	18.2	1.2	0.9	1.0
Low π	44.6	58.9	22.7	0.89	0.22	0.89	-0.05	0.17	-0.05	24.1	22.0	18.2	1.5	1.3	1.1

Table II: Summary Statistics by π-quartile. Market beta and Forex beta are estimated as explained in the main text. Market leverage is defined as (DLTT + DLC) / (DLTT + DLC + Market Cap). Market to book is the ratio of market assets to book assets and is computed as (LT + PSTK - TXDITC + Market Cap) / AT. Variables indicated with capital letters are from Compustat Global. Market capitalization is from Bloomberg.

	Abnormal Returns 2014						Abnormal Returns 2016					
H (days)	5	10	21	63	126	252	5	10	21	63	126	252
π	11.06**	30.60***	22.51**	63.85***	152.1***	275.0***	15.52**	16.69**	30.48***	34.18**	82.20***	110.4***
	(2.11)	(4.62)	(2.52)	(4.34)	(8.50)	(10.32)	(2.96)	(2.52)	(3.42)	(2.32)	(4.60)	(4.14)
u	-0.00	-0.02***	-0.01	-0.02***	-0.02	-0.04*	0.010*	0.004	0.024**	0.014	0.045**	0.102***
	(-0.39)	(-3.20)	(-1.30)	(-2.52)	(-1.65)	(-1.99)	(2.06)	(0.67)	(2.55)	(1.35)	(2.91)	(4.70)
Mkt Beta	-0.04*	-0.07*	-0.08*	-0.17**	-0.32**	-0.45***	0.016	-0.01	0.009	0.012	0.007	0.041
	(-1.47)	(-1.97)	(-1.70)	(-2.32)	(-2.22)	(-2.68)	(0.59)	(-0.26)	(0.19)	(0.16)	(0.05)	(0.24)
Forex Beta	0.039**	0.041**	0.095***	0.087**	0.019	-0.12	-0.00	0.014	0.053**	0.049	0.190***	0.166
	(2.81)	(2.32)	(4.11)	(2.26)	(0.30)	(-0.03)	(-0.48)	(0.80)	(2.32)	(1.28)	(2.92)	(0.04)
log(Mkt Cap)	0.002	0.006	0.001	-0.00	0.005	-0.00	-0.00	-0.00	-0.01	-0.02	-0.06***	-0.10***
	(0.63)	(1.16)	(0.22)	(-0.07)	(0.26)	(-0.72)	(-1.40)	(-0.49)	(-1.60)	(-1.70)	(-3.43)	(-8.54)
Amihud	0.000	4.618	0.001	0.000	0.019***	0.005	0.000	0.000	-0.00	-0.00	-0.00**	-0.01***
	(0.66)	(0.03)	(0.75)	(0.36)	(7.19)	(1.67)	(0.18)	(0.11)	(-0.59)	(-1.31)	(-3.23)	(-3.11)
Obs	1,701	1,701	1,701	1,701	1,701	1,701	1,734	1,734	1,734	1,734	1,734	1,734
R-squared	0.114	0.160	0.102	0.120	0.180	0.141	0.071	0.050	0.101	0.111	0.203	0.191
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table III: Cross-sectional regressions with industry fixed effects. The table reports the coefficients of cross-sectional regressions of cumulative returns (in percentage points) computed at different horizons on the predicted price impact π and a set of control variables (standardized). In this specification we include industry fixed effects, based on the first 3 digits of the Standard Industry Classification Code (SIC-3). Regressions are run separately for the two events. The dependent variable is the cumulative abnormal return with respect to the market model estimated in the pre-event window. t-statistics from placebo regressions are in parenthesis; asterisks denote conventional significance levels (***=1%, **=5%, *=10%) based on empirical p-values.

	Abnormal Returns 2014						Abnormal Returns 2016					
H (days)	5	10	21	63	126	252	5	10	21	63	126	252
π	19.04***	42.17***	28.77***	72.38***	172.5***	300.7***	17.61**	17.34*	31.88***	38.51**	87.69***	112.9***
	(3.22)	(5.69)	(2.86)	(4.57)	(9.25)	(11.60)	(2.98)	(2.34)	(3.16)	(2.43)	(4.70)	(4.36)
u	0.008*	-0.00	-0.00	-0.03***	-0.03**	-0.11***	0.014***	0.001	-0.00	-0.02*	-0.04**	0.001
	(1.90)	(-1.32)	(-0.97)	(-3.44)	(-2.06)	(-4.64)	(3.28)	(0.27)	(-0.24)	(-2.15)	(-2.47)	(0.07)
Mkt Beta	-0.02	-0.05	-0.07	-0.16*	-0.29**	-0.40***	0.026	0.002	0.027	0.028	0.048	0.076
	(-0.84)	(-1.48)	(-1.37)	(-2.06)	(-2.05)	(-2.14)	(0.86)	(0.07)	(0.51)	(0.36)	(0.33)	(0.41)
Forex Beta	0.037**	0.042*	0.102***	0.097**	0.043	-0.13	-0.00	0.018	0.053*	0.060	0.196***	0.186***
	(2.20)	(2.02)	(3.81)	(2.28)	(0.61)	(-1.72)	(-0.18)	(0.90)	(2.00)	(1.43)	(2.73)	(2.33)
log(Mkkt Cap)	0.001	0.006	0.001	0.001	0.005	-0.00	-0.00	-0.00	-0.01*	-0.03	-0.07***	-0.11***
	(0.33)	(0.94)	(0.16)	(0.06)	(0.24)	(-0.33)	(-1.48)	(-0.55)	(-1.80)	(-1.79)	(-3.58)	(-7.59)
Amihud	0.001	0.000	4.552	0.001	0.016***	0.018***	0.000	0.000	-0.00	-0.00	-0.00**	-0.00
	(0.79)	(0.25)	(0.00)	(0.67)	(6.13)	(7.14)	(0.48)	(0.39)	(-0.53)	(-0.96)	(-3.27)	(-2.45)
Nikkei	-0.01	-0.02*	-0.00	-0.00	-0.00	0.048*	-0.00	0.003	0.038*	0.049*	0.122***	0.153***
	(-1.26)	(-1.72)	(-0.27)	(-0.08)	(-0.18)	(1.54)	(-0.38)	(0.24)	(2.23)	(2.32)	(4.03)	(4.88)
Obs	1,807	1,807	1,807	1,807	1,807	1,807	1,839	1,839	1,839	1,839	1,839	1,839
R-squared	0.06	0.11	0.07	0.10	0.15	0.12	0.05	0.03	0.08	0.08	0.19	0.15
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table IV: Cross-sectional regressions controlling for Nikkei. The table reports the coefficients of cross-sectional regressions of cumulative returns (in percentage points) computed at different horizons on the predicted price impact π and a set of control variables (standardized). In this specification we add a dummy variable *Nikkei* that indicates stocks belonging to the Nikkei 225 Index. Regressions are run separately for the two events. The dependent variable is the cumulative abnormal return with respect to the market model estimated in the pre-event window. t-statistics from placebo regressions are in parenthesis; asterisks denote conventional significance levels (***=1%, **=5%, *=10%) based on empirical p-values.

	Abnormal Returns 2014						Abnormal Returns 2016					
H (days)	5	10	21	63	126	252	5	10	21	63	126	252
π	12.21**	32.64***	22.95**	63.97***	150.7***	266.7***	15.62**	16.37**	28.39**	31.48**	75.75***	102.7***
	(2.28)	(4.80)	(2.51)	(4.38)	(8.72)	(10.01)	(2.91)	(2.41)	(3.11)	(2.16)	(4.38)	(3.86)
u	0.006	-0.00	-0.00	-0.02***	-0.03**	-0.10***	0.012**	0.000	-0.00	-0.02*	-0.04**	-0.00
	(1.35)	(-1.41)	(-1.16)	(-2.89)	(-2.32)	(-4.28)	(2.72)	(0.05)	(-0.56)	(-2.42)	(-2.95)	(-0.21)
Mkt Beta	-0.04*	-0.07*	-0.08*	-0.17**	-0.33**	-0.46***	0.016	-0.00	0.011	0.015	0.014	0.050
	(-1.48)	(-1.98)	(-1.71)	(-2.38)	(-2.23)	(-2.28)	(0.59)	(-0.25)	(0.24)	(0.21)	(0.10)	(0.25)
Forex Beta	0.040**	0.043**	0.095***	0.087**	0.018	-0.12***	-0.00	0.012	0.044*	0.038	0.163**	0.134***
	(2.83)	(2.38)	(4.11)	(2.25)	(0.28)	(-1.93)	(-0.45)	(0.71)	(1.93)	(0.98)	(2.49)	(2.01)
log(Mkt Cap)	0.002	0.006	0.001	-0.00	0.004	-0.00	-0.00	-0.00	-0.01	-0.02	-0.06***	-0.10***
	(0.61)	(1.09)	(0.21)	(-0.07)	(0.24)	(-0.81)	(-1.29)	(-0.48)	(-1.61)	(-1.69)	(-3.43)	(-9.10)
Amihud	0.001	0.000	0.001	0.000	0.019***	0.005	0.000	0.000	-0.00	-0.00	-0.00**	-0.01***
	(0.67)	(0.06)	(0.70)	(0.34)	(6.97)	(1.52)	(0.18)	(0.09)	(-0.64)	(-1.32)	(-3.33)	(-3.15)
Nikkei	-0.01	-0.01	-0.00	-0.00	0.011	0.074***	-0.00	0.006	0.039*	0.050*	0.120***	0.143***
	(-1.04)	(-1.39)	(-0.22)	(-0.05)	(0.36)	(2.15)	(-0.17)	(0.46)	(2.24)	(2.29)	(3.62)	(4.17)
Obs	1,701	1,701	1,701	1,701	1,701	1,701	1,734	1,734	1,734	1,734	1,734	1,734
R-squared	0.12	0.16	0.10	0.12	0.18	0.14	0.07	0.05	0.11	0.12	0.21	0.20
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table V: Cross-sectional regressions controlling for Nikkei and industry. The table reports the coefficients of cross-sectional regressions of cumulative returns (in percentage points) computed at different horizons on the predicted price impact π and a set of control variables (standardized). In this specification we add a dummy variable *Nikkei* that indicates stocks belonging to the Nikkei 225 Index and industry fixed effects based on the first 3 digits of the Standard Industry Classification Code (SIC-3). Regressions are run separately for the two events. The dependent variable is the cumulative abnormal return with respect to the market model estimated in the pre-event window. t-statistics from placebo regressions are in parenthesis; asterisks denote conventional significance levels (***=1%, **=5%, *=10%) based on empirical p-values.