Appendices for online publication

Appendix A: data

Appendix B: VECM

Appendix C: transaction data

Appendix D: carrier pigeons

Appendix E: additional figures

Appendix F: additional tables

Appendix A: Data

Price data

The empirical analysis of this paper is based on detailed price data from the Amsterdam and London markets and information about the arrival of packet boats in Hellevoetsluys. Data on Amsterdam stock prices were hand collected from the *Amsterdamsche Courant* and where necessary supplemented by information from the *Opregte Haerlemsche Courant*. For each stock, three prices a week are available (for Monday, Wednesday and Friday).[38] I collected data for three English stocks (EIC, SSC and BoE) and two English bonds (3 and 4% annuities). In both London and Amsterdam, prices were reported as percentages of the nominal or face value which was defined in Pound Sterling. Amsterdam prices were therefore effectively in Pound Sterling. Price data from London are available on a daily frequency and are taken from Neal (1990) and where necessary supplemented with data from Rogers (1902).[39] Unfortunately both sources do not report prices for the 4% annuities. In addition, price observations for the SSC in London are very rare for my sample periods. As a result London price data covers the EIC, BoE and 3% Annuities only.

The prices the Dutch papers published were supplied at the end of the afternoon by a committee of so-called sworn brokers who were officially responsible for the reporting of these prices (Smith 1919, p. 109; Jonker 1996, p. 147). The prices functioned as an official reference for investors who used these prices as an ex post control of their brokers (Polak 1924; Hoes 1986). The correspondence in Van Nierop (1931) suggests that prices were interpreted as the midpoint of prices observed on a certain day.

By the second half of the 18$^{\text{th}}$ century, a significant fraction of trade in the English stocks in Amsterdam was concentrated in the futures market (Van Dillen 1931). As a result all available price data for the Amsterdam market refers to futures prices[40]. This has an impor-

[38] Previous research by Neal (1990) and Dempster et al. (2000) use Amsterdam prices with a frequency of 2 observations a month.

[39] Neal (1990) uses data reported by Castaing's *Course of the Exchange*. Rogers (1902) uses stock prices reported by various British newspapers. Rogers also reports the days English stocks went ex-dividend in London. Ex-dividend dates in Amsterdam were reported in the *Amsterdamsche Courant*. Dividends for the relevant English companies come from Clapham (1944) and Bowen (2007).

[40] A future contract could have 4 possible expiration dates: February 15, May 15, August 15, or November

tant implication for the interpretation of the price data available in Amsterdam. Spot and future prices are linked through the cost-to-carry component. This means that fluctuations in the short term interest rate could have an impact on stock returns in the Amsterdam market. Fortunately, the future contracts in Amsterdam only had limited running periods (up to three months), so the impact of interest rate fluctuations was likely small. Robustness checks in table 13 in appendix F indicate that there is no discernible difference between the variance of returns for futures contracts with relatively long or short maturities. This suggests that fluctuations in interest rates had little impact on overall volatility.

While security prices for the Amsterdam market refer to future contracts, London prices are spot. To make these two price series consistent I convert Amsterdam future prices into spot prices using the cost-to-carry rate. There are generally no commercial interest rates available for the period (see Flandreau et al. 2008 for an exception). In addition, the cost-to-carry rate I am interested in could also be driven by counterparty risk specific to the futures market for a given security. Finally, since time to expiration could take anything between 1 day and three months I also need to be concerned about the yield curve.

To approximate relevant interest rates and the yield curve I run the following regression:

$$\log(p_{it}^{A}) = \log(\widetilde{p}_{it}^{L}) + r_t \tau$$

where $\tau = \frac{T^{\text{expiration}} - t}{365}$ and $r_t = \beta_0 + \beta_1 \tau + \beta_2 \tau^2 + \beta_3 \tau^3$ and where $\widetilde{p}_{it}^{L}$ is the London spot price observed in Amsterdam on date t.

I run the above regression and use parameters β to approximate the relevant interest rate at time t. I allow the β's to differ for the two different sample periods. I also allow for different interest rates for each security. Average annual interest rates are in the ballpark of 3 (1771-1777) to 7% (1783-1787) and are generally upward sloping, especially for the first period. Note that any structural differences between the Amsterdam and London price are captured by β_0. β_0 is very tightly estimated around zero.

15. Prices reported were for the future contract ending at the nearest date. Prices in London are spot.

Boat arrivals

The arrival dates of boats in Hellevoetsluys were hand collected from the *Rotterdamsche Courant*. The newspaper reports on what day a specific boat arrived and whether it arrived before or after 12 pm. This data can be used to determine when news from England arrived in Amsterdam. It took approximately 16 hours for news from Hellevoetsluys to be transported to Amsterdam (Stitt Dibden 1965, p. 9). This generally means that the information brought in on a certain day was only available to Amsterdam investors during the next day.[41] The *Rotterdamsche Courant* not only mentions the day a specific boat arrived but also the date of the news it carried. This information can be used to reconstruct what London price information was available to Amsterdam investors at certain points in time. In addition, I hand collected information about the arrival of Amsterdam news in London from a series of English newspapers (*General Evening Post, Lloyd's Evening Post, Lloyd's Lists, London Chronicle,* and *Middlesex Journal*).

Finally I use data on weather conditions from the observatory of Zwanenburg, a town close to Amsterdam. This data provides three observations a day on the wind direction and other weather variables. This data comes from the *KNMI*.

Sample selection

For this paper I study two sample periods: September 1771 - December 1777 and September 1783 - March 1787. Both sample periods were characterized by peace on the European continent and the absence of severe financial crises. The starting point of the first period, September 1771, is determined by data limitations. The period stops in December 1777 as tensions between France and England increased, eventually leading to outright naval war in July 1778 (in 1780 naval war also broke out between the Dutch Republic and England). There were two minor financial crises in the period. In June 1772 the default of London speculator Alexander Fordyce led to some turbulence in financial markets in London and

[41] There are some exceptions. If a boat arrived in Hellevoetsluys very early in the morning, it sometimes happened that the information from London was available in Amsterdam on the same day. I use the publication dates of English news in the *Amsterdamsche Courant* and *Rotterdamsche Courant* to identify these cases.

Amsterdam. Furthermore, after Christmas 1772 a consortium of Dutch bankers who had been bulling the market for English stocks defaulted. This led to a short lived financial crisis in Amsterdam (Wilson 1941). Unreported results indicate that dropping these two episodes from the estimates does not change the results.

The second sample period starts in September 1783, right after the signing of an official peace treaty between France and England and a preliminary peace treaty between England and the Dutch Republic. There had been a general armistice since January 1783 and when the official treaties were signed the international situation had calmed down. The second sample period stops in March 1787 when domestic tensions in the Netherlands rose, eventually leading to minor skirmishes in May 1787 and an intervention by the Prussian army in September 1787.

Appendix B: VECM

In this appendix I analyze the flow of information between London and Amsterdam with a Vector Error Correction Model (VECM) (compare Dempster et al. 2000). For the Amsterdam market three prices per week are available: for Monday, Wednesday and Friday. Based on these prices, returns are calculated for two (Fri-Wed and Wed-Mon) or three day periods (Mon-Fri). Prices in London are available on a daily frequency, but to make the empirical testing consistent I only use price data for the same days as I have data available in Amsterdam. Detailed price data in London is only available for the EIC, BoE and 3% Annuities only.

Based on these two or three day returns I estimate a VECM model with a total of 5 lags[42] of the following form

$$\Delta p_t = \alpha_0 - \alpha_1 z_{t-1} + \beta_1 \Delta p_{t-1} + ... + \beta_5 \Delta p_{t-5} + \varepsilon_t \tag{18}$$

where $\Delta p_t = \begin{bmatrix} \Delta p_t^{LND} \\ \Delta p_t^{AMS} \end{bmatrix}$ and $z_{t-1} = \left(p_{t-1}^{AMS} - p_{t-1}^{LND}\right)$. Period t stands for 2 or 3 days. I estimate the VECM separately for EIC and BoE stock and the 3% annuities.[43] To be clear, in these regressions I use no data on the actual flow of information.

Based on the regression output I estimate Impulse Response Functions (IRFs). In figure 9 I present the IRFs for the EIC in response to non-factorized one sd innovations in either the London price or the Amsterdam price. The corresponding IRFs for the BoE and the 3% Annuities are presented in figures 10 and 11. Figure 12 presents the EIC's IRFs for orthogonalized Cholesky one sd innovations. A priori it is not clear what the Cholesky ordering of the variables should be. Intuitively it seems obvious to order London prices first. However that would bias the results in my favor. The non-factorized results are therefore more relevant in this context. The figures clearly show that Amsterdam prices strongly respond to London prices, but that the reverse response is very weak. This is true for all

[42] The lag length of 5 is standard in the literature. If the AIC or BIC are used to select the optimal number of lags, results are virtually unchanged.

[43] Regression results available upon request.

three stocks. It seems that most relevant information was generated in London.

[Figures 9 to 12 about here]

Unfortunately no standard errors are available for IRFs that are based on VECMs. Instead I calculate Hasbrouck's (1995) information shares. I estimate the common random walk component of the different security price series in both cities and I calculate what fraction of its variance can be attributed to each market. The ordering of the variables in the VECM model matters quantitatively. The results in the first column of table 9 indicate that if London prices are ordered first, around 99% of all relevant information seems to have been generated in London. If Amsterdam prices are ordered first this number falls to 90%. In the literature it is usually assumed that the true information share lies somewhere in between, in this case somewhere around 95%.

[Table 9 about here]

The findings are not necessarily representative for the entire 18th century (Neal 1990, Dempster et al. 2000). To illustrate this point I also collected price data for January 1778 - August 1783. As indicated in the historical overview this period featured war between England, France and the Dutch Republic. It is likely that news from other sources did play an important role during this period. Figure 13 presents the IRFs for EIC stock for this period of international conflict.[44] The corresponding IRFs for the BoE and the 3% Annuities are presented in figures 14 and 15. The IRFs display the impact of non-orthogonalized one sd shocks. Table 10 presents Hasbrouck's information shares for this period of conflict. The results clearly show that during this period news did come from other sources. The IRFs show a stronger response of London returns to price changes in Amsterdam and the Hasbrouck information shares indicate that more information seems to have had its origins in Amsterdam. This seems to have been the case especially for BoE stock. These results shed some additional light on the evidence that for 1771-1777 and 1783-1787 most news originated in England. This evidence is not just an artefact of the methodologies used or the specific form of the data. Rather, this finding is primarily driven by the choice of the sample periods.

[44] Figure 16 presents the EIC's IRFs for orthoganalized Cholesky one sd innovations.

[Figures 13 to 16 about here]

[Table 10 about here]

Figure 9: Impulse response EIC - peace

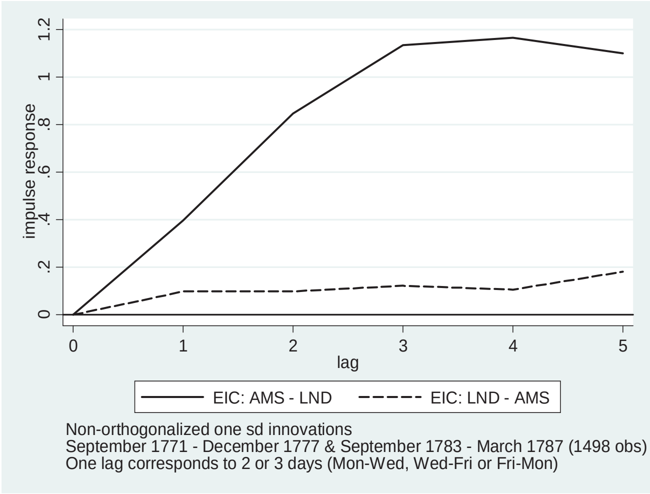


Figure 10: Impulse response function BoE - peace

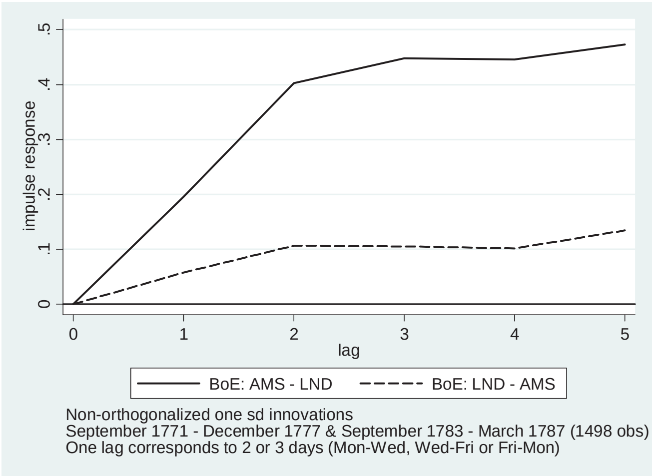


Figure 11: Impulse response function 3% Annuities - peace

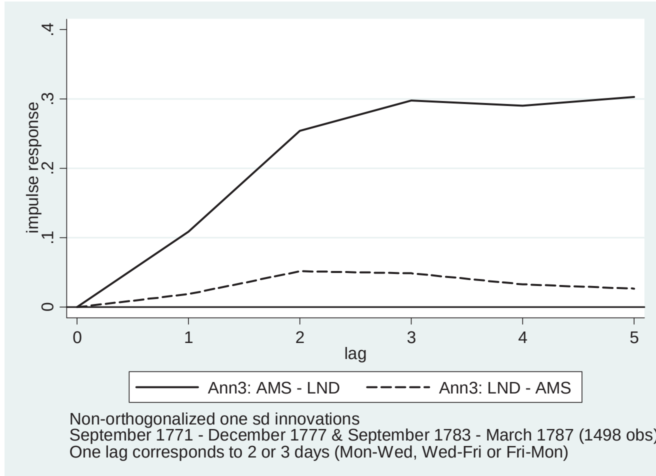


Figure 12: Impulse response function EIC - peace

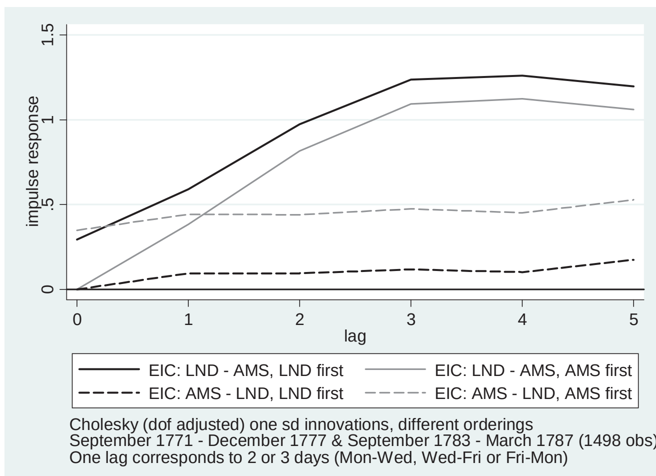


Figure 13: Impulse response EIC - conflict

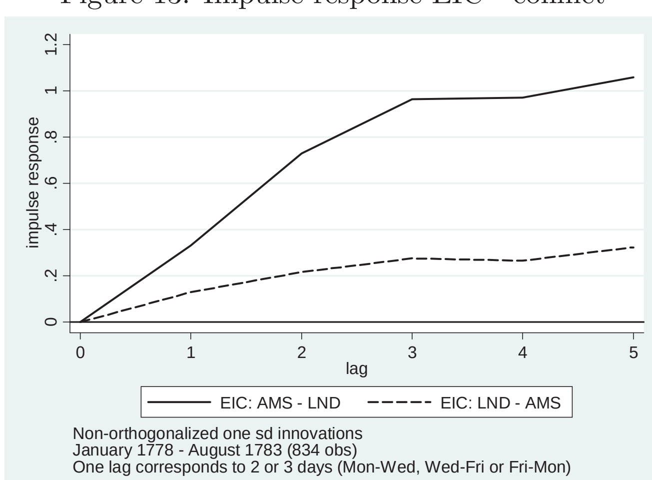


Figure 14: Impulse response function BoE - conflict

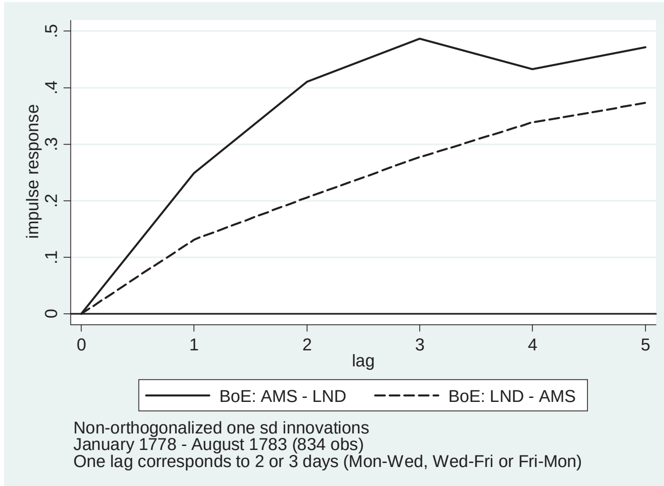


Figure 15: Impulse response function 3% Annuities - conflict

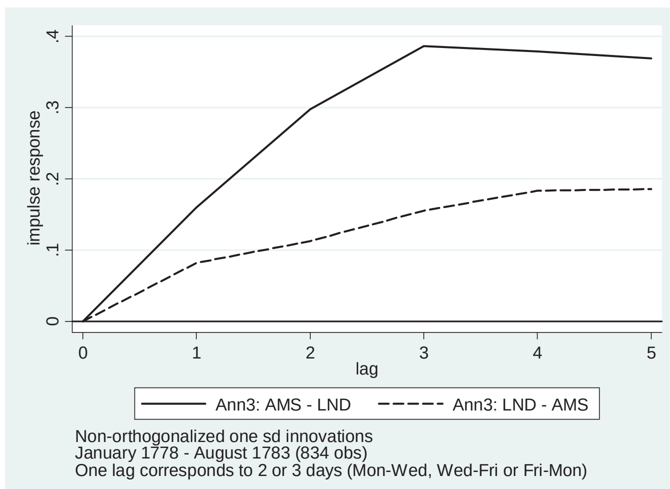


Figure 16: Impulse response function EIC - conflict

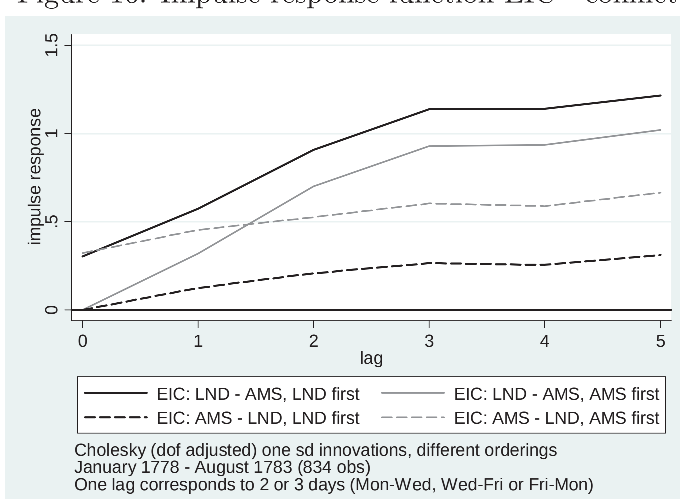


Table 9: Hasbrouck information shares - peace

	Ordering LND first	AMS first	Mid-point
EIC	0.998	0.867	0.933
BoE	0.992	0.854	0.923
3% Ann	0.999	0.973	0.986
Market	0.955	0.822	0.889

Hasbrouck information shares based on VECM models that use prices in Amsterdam and London for three days a week (Monday, Wednesday and Friday). The VECM models that are estimated use 5 lags (where each lag represents 2 or 3 days). Reported information shares for different Cholesky orderings (London first or Amsterdam first) and a simple arithmetic average of the two.
Periods: Sept. 1771 - Dec. 1777 and Sept. 1783 - March 1787 (1498 obs.)

Table 10: Hasbrouck information shares - conflict

	Ordering LND first	AMS first	Mid-point
EIC	0.799	0.552	0.676
BoE	0.730	0.424	0.577
3% Ann	0.864	0.647	0.756
Market	0.797	0.543	0.670

Hasbrouck information shares based on VECM models that use prices in Amsterdam and London for three days a week (Monday, Wednesday and Friday). The VECM models that are estimated use 5 lags (where each lag represents 2 or 3 days). Reported information shares for different Cholesky orderings (London first or Amsterdam first) and a simple arithmetic average of the two.
Period: Jan. 1778 - Aug. 1783 (834 obs.)

Appendix C: Transaction data

Findings

How much trading was actually taking place on days without news? If trading volumes in Amsterdam were very low on no-news days, price changes in the absence of news would have little economic meaning. No volume data is available for this period and that makes it difficult to test this. However some individual transactions were recorded in the historical records that can be used. I have two sets of transactions available. The first set includes security transactions I reconstructed from the archives of the Jewish broker Abraham Cohen de Lara and the Amsterdam notary Daniel van den Brink (compare Wilson 1941). Of the total of 32 transactions[45] I found that only 4 transactions, or 12.5%, took place on days with news (9% when value weighted). 32 may seem like a small number of transactions. Note however that the average transaction size of $\sim$ £$1,500$ translates into £$150,000$ in today's money (Officer 2009). On average, news from London reached Amsterdam two times a week. So, if market participants were indifferent between trading on days with or without news, we would expect that on average 28.6% of transactions would take place on days with news. This means that there seems to have been a tendency to trade on days without news. The difference between these percentages is significant with a p-value of 0.056 (based on a binomial distribution and a two-sided test).

This is admittedly a small sample. However, the finding that trading volumes were **not** significantly lower on days without news is supported by a second set of transactions that can be reconstructed from repo contracts (or margin loans) in English stocks that were recorded in the Amsterdam notary archives (see appendix A on how I reconstruct transaction dates from these repo contracts or margin loans). I collected data on a total of 151 such transactions in English securities between 1771 and 1774. Roughly 80% of these transactions involved EIC stock.[46] Of these 151 transactions 45, or 30%, took place on days that news from London arrived (31% when value weighted). This is very close to the 28.6% one would

[45] Roughly equally divided over the EIC, BoE and SSC stock and 3% Annuities.

[46] The combined nominal value of the transactions in EIC stock amounted to approximately £200 thousand. The total nominal value of the Company's stock was £3.2 million.

expect if transactions were randomly distributed over days with and without news. The difference between the two percentages is insignificant with a p-value of 0.798 (again, based on a binomial distribution and a two-sided test). In other words there does not seem to have been a tendency to trade more on days with news.

This simple calculation ignores the fact that there were certain regularities in trading intensity and the arrival of information over the week. The clearest example is Sunday. Trade on this day was limited, while news arrived regularly. In the simple framework this is picked up as evidence that trading was limited on the days news came in. One way to account for these day-of-the-week patterns is to estimate a probit or logit model. Results (available upon request) are consistent with the simple calculations.

Sources

How can transactions be reconstructed from repo contracts or margin loans? Stock traders frequently bought English stocks on credit. They would buy a stock and they would immediately use the security as collateral to finance a large part of the purchase. These loan agreements, which are very similar to today's repo contracts, had to be signed before a notary and many of these notarial deeds survive in the archival sources.

From these notarial deeds it can be inferred on what date a stock was transacted. The deeds mention the starting date of the loan and this corresponds quite precisely to the date the stock was actually purchased. Evidence for this is provided by the following. A large fraction of the stock purchases were executions of expiring future contracts that were signed at an earlier (unknown) point in time. The expiry dates of the future contracts were fully standardized (see Appendix A) and are therefore always known. I checked whether the expiry date of the future contract corresponded with the starting date of the loan. Only in 7.5% of transactions did the two dates deviate.

I obtained a sample of these contracts by collecting all notarial deeds involving English securities from the archives of notary Van den Brink between November 1771 and February 1774 (SAA 5075: 10593-10613). Notary Van den Brink specialized in transactions related to the English funds and his archives are therefore relatively abundant with the relevant contracts (this source was first used by Wilson 1941). The choice for the sample period is determined by data limitations.

I collected a total of 238 transactions in English stocks. Around a third of these transactions had to be discarded, either because they dealt with the rolling over of existing contracts or because they involved the execution of future contracts that occurred on fixed expiry days. In the end 151 transactions were left.

Appendix D: carrier pigeons

Even though the use of carrier pigeons can be retraced to antiquity, the historical record suggests that they were only used after 1800 in Western Europe (Levi 1977). It is unlikely that market participants were already using them in the 1770s and 1780s. First of all, the private correspondence from Hope & Co. with its London agents suggests that no carrier pigeons were used. If one of the most important banks of the period did not use carrier pigeons, it is hard to imagine who would have.

Secondly, Dickens (1850) gives a description of the carrier pigeon system used in the 1840s and his account shows that one needed a well organized system to use carrier pigeons to transmit information from London to Amsterdam.[47] I know of no historical reference indicating that such a system existed in my sample periods.

Finally, Dickens indicates that the use of carrier pigeons was problematic under adverse weather conditions.[48] This is illustrated by the carrier pigeon service that was set up between Antwerp and Rotterdam in 1848 when the two cities were not yet connected by telegraph. During the winter months carrier pigeons could not be used and they were replaced by horses. The birds did not cope well with winter weather (Ten Brink 1957). If people did use pigeons in the 1770s and 1780s I would expect to see different volatility patterns in Amsterdam in the winter months when compared to the rest of the year. Table 11 presents the return variance on no-news days during winter months and the rest of the year. Figure 17 presents the corresponding return distributions for EIC stock. Results indicate that there were hardly any seasonal differences. If anything, the variance of non-news returns is slightly higher during the winter. However, these differences are not statistically significant. In short, the evidence does not suggest that carrier pigeons played an important role.

[Figure 17 about here]

[Table 11 about here]

[47] Carrier pigeons could only fly limited stretches. The pigeon post connection between London and Paris in the 1840s therefore featured multiple stages of individual pigeon flights. To send a message from London to Amsterdam one could not have used a single bird flying the whole stretch. Rather, one would have needed an intricate system of carrier pigeon stations.

[48] Among other things, pigeons rely on visual landmarks and they can lose their way under foggy conditions. In addition, Dickens indicates that two thirds of the birds were usually lost in a storm.

Figure 17: Return distributions EIC - winter vs rest of year

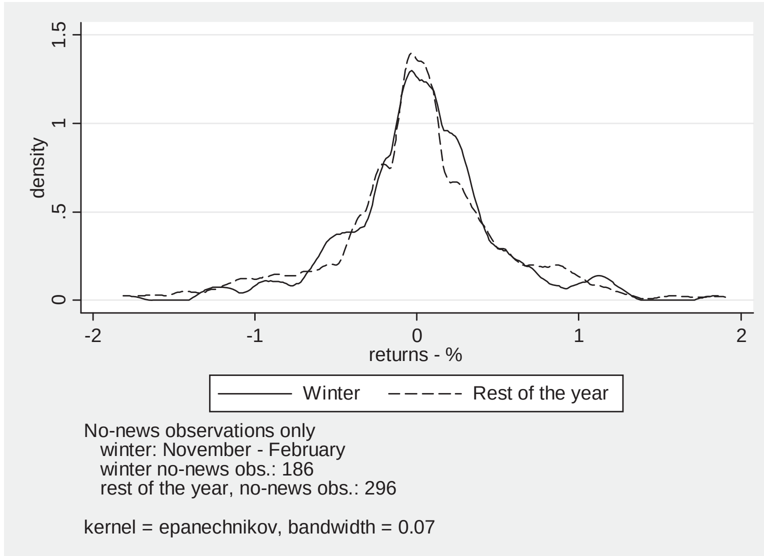


Table 11: Winter

	$var\left(\Delta p_t^{AMS}\right)$					
	EIC	SSC	BoE	3% Ann	4% Ann	Obs.
Winter	0.278	0.157	0.192	0.245	0.172	186
Rest of the year	0.277	0.128	0.199	0.197	0.180	296
B-F test	0.16	2.17	0.04	1.94	0.51	
(p-value)	(0.686)	(0.141)	(0.836)	(0.165)	(0.477)	

Variances of security returns in Amsterdam. Returns calculated over 2 or 3 day periods (denoted t). No-news observations only.
The sample is split in winter and rest of the year. Winter is classified as November through February, which, in terms of weather, are the worst months of the year in the North Sea area.
Periods: Sept. 1771 - Dec. 1777 and Sept. 1783 - Mar. 1787.
The equality of variances for winter and rest of the year observations is tested using a Brown-Forsythe (B-F) test ($H_0 : ratio = 0$).

Appendix E: additional figures

Figure 18: Return distributions SSC

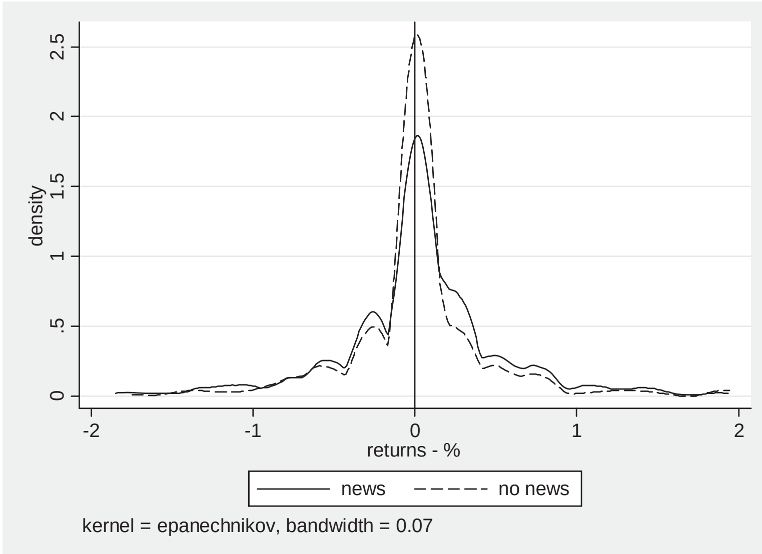


Figure 19: Return distribution BoE

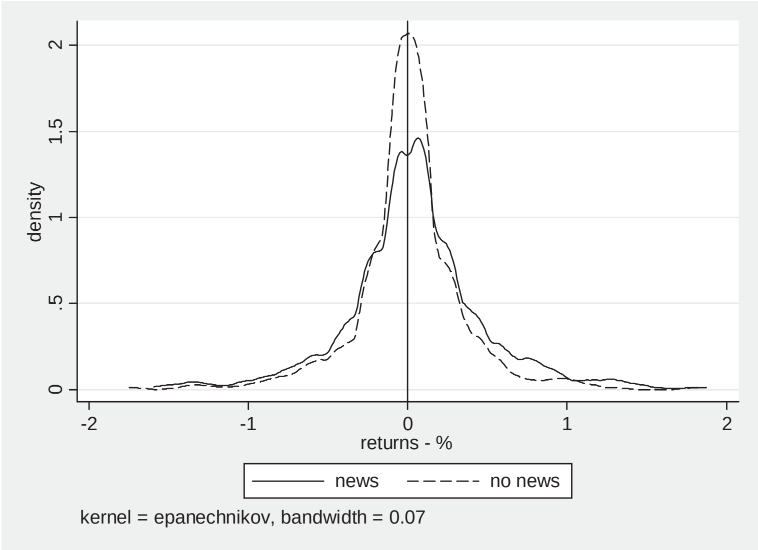


Figure 20: Return distributions 3% Annuities

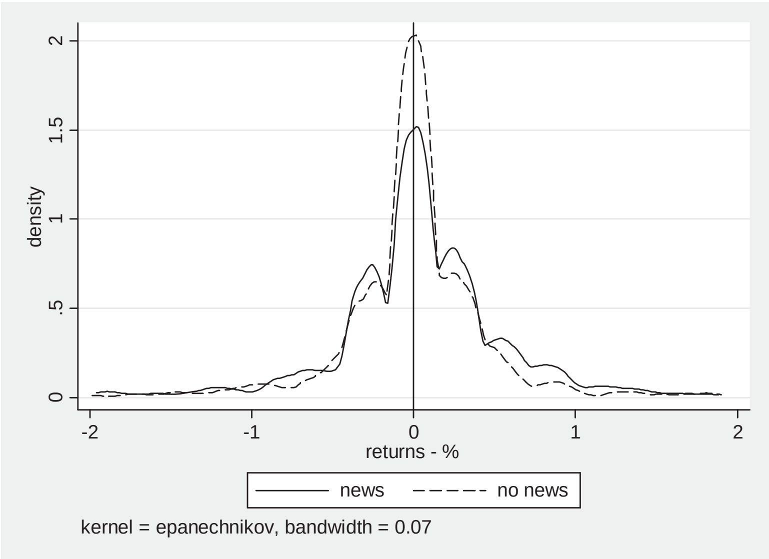


Figure 21: Return distribution 4% Annuities

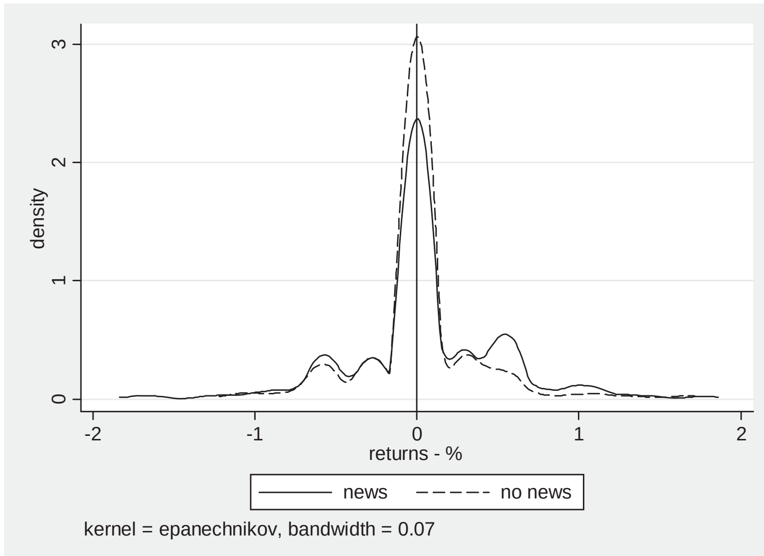


Figure 22: Return distributions EIC - news from Asia

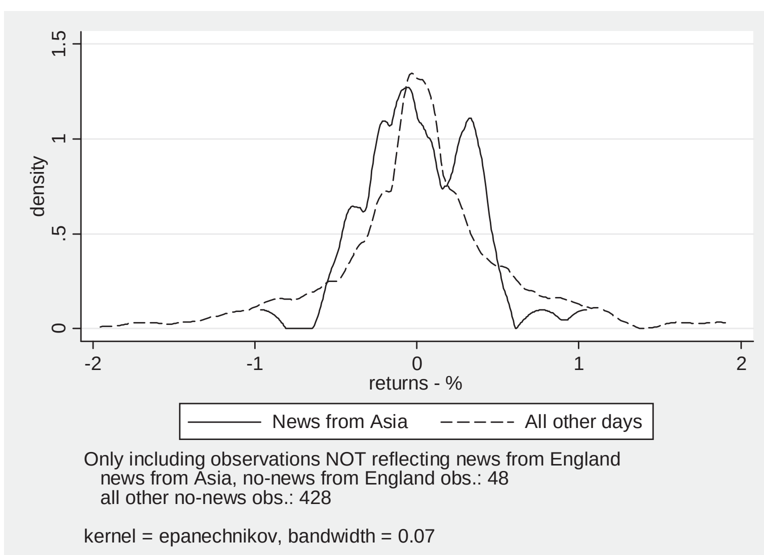


Figure 23: Return distributions EIC - bad weather sample B

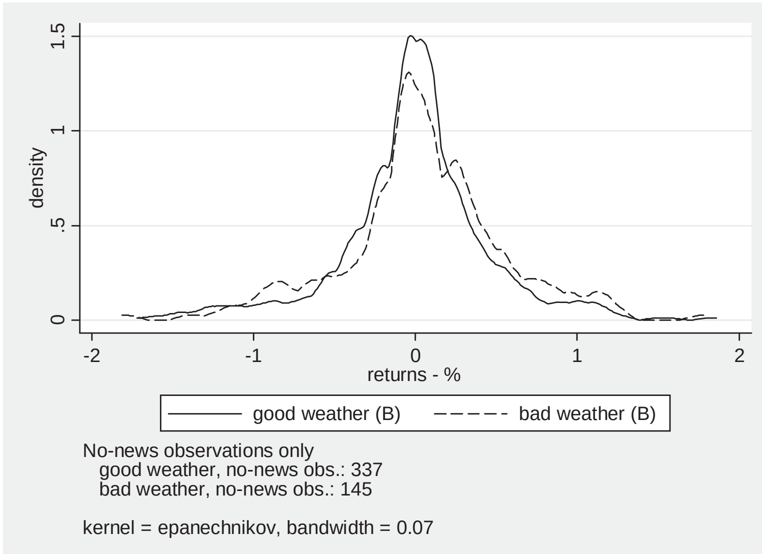


Figure 24: Return distributions EIC - bad weather sample C

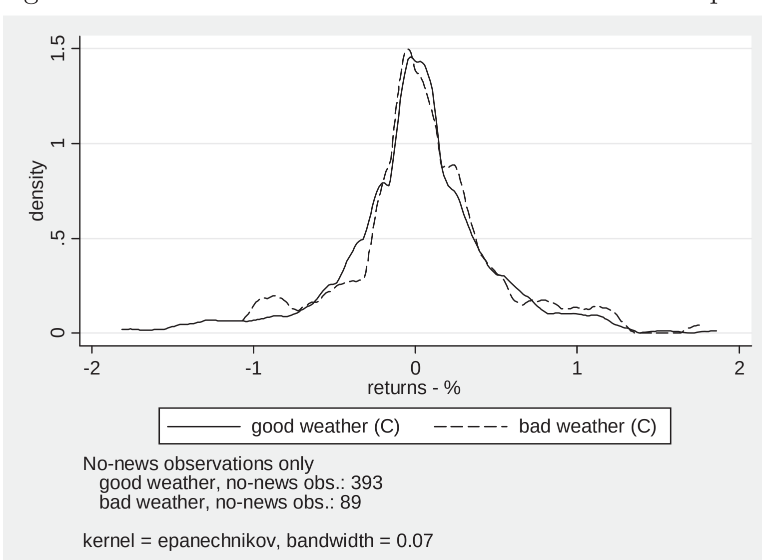


Figure 25: Price differences Amsterdam and London - BoE

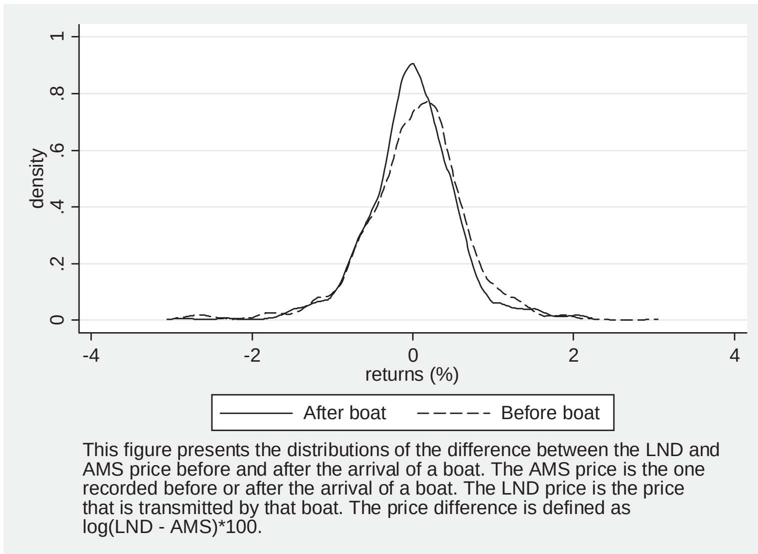
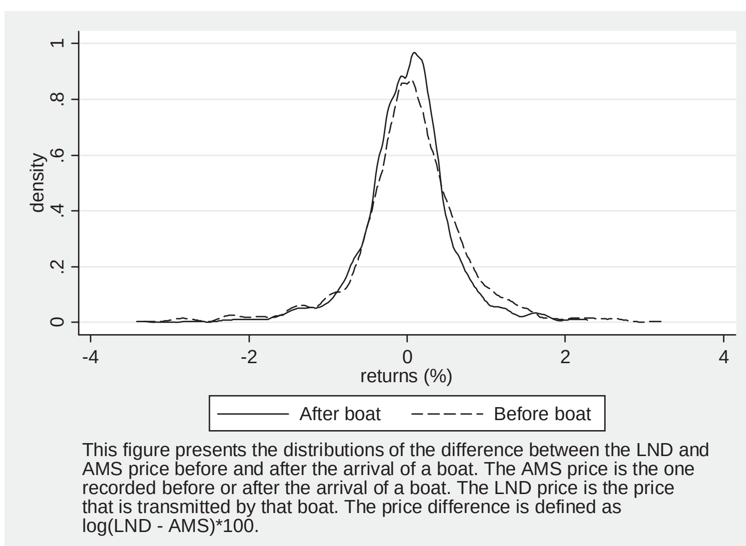


Figure 26: Price differences Amsterdam and London - 3% Annuities



Appendix F: additional tables

Table 12: News from Asia

	EIC	SSC	BoE	3% Ann	4% Ann	Obs.
$var\left(\Delta p_t^{AMS} \mid N_t = 0, A_t = 0\right)$	0.295	0.206	0.149	0.231	0.187	434
$var\left(\Delta p_t^{AMS} \mid N_t = 0, A_t = 1\right)$	0.125	0.109	0.049	0.067	0.087	48
B-F test	1.5	2.0	3.3	2.8	0.1	
(p-value)	(0.220)	(0.161)	(0.071)	(0.094)	(0.760)	

Variances of security returns in Amsterdam. Returns calculated over 2 or 3 day periods (denoted t). Observations without news from England only.
The sample is split in observations with ($A_t = 1$) and without ($A_t = 0$) the arrival of news from Asia on Dutch ships.
Periods: Sept. 1771 - Dec. 1777 and Sept. 1783 - Mar. 1787.
The equality of variances for observations with and without news from Asia is tested using a Brown-Forsythe (B-F) test ($H_0 : ratio = 0$).

Table 13: Time to expiration

	EIC	SSC	BoE	3% Ann	4% Ann	Obs.
$var\left(\Delta p_t^{AMS} \mid T - t \geq 10 \text{ weeks}\right)$	0.458	0.166	0.262	0.225	0.204	305
$var\left(\Delta p_t^{AMS} \mid T - t \leq 3 \text{ weeks}\right)$	0.585	0.195	0.295	0.388	0.235	289
B-F test	0.0	0.0	0.1	2.0	0.6	
(p-value)	(0.889)	(0.867)	(0.743)	(0.157)	(0.423)	

Variances of security returns in Amsterdam. Returns calculated over 2 or 3 day periods (denoted t).
T indicates the expiration date of a future contract. This table presents two sub-samples:
- Amsterdam returns on future contracts with time to expiration $\geq$ 4 weeks
- Amsterdam returns on future contracts with time to expiration $\leq$ 10 weeks (with a maximum of 12 weeks)

Periods: Sept. 1771 - Dec 1777 and Sept. 1783 - Mar. 1787
Brown-Forsythe tests are performed on the equality of variances for returns on contracts with long and short time to expiration. If shocks to the cost-to-carry component drive a significant fraction of returns, we would expect $var\left(\Delta p_t^{AMS} \mid T - t \geq 10 \text{ weeks}\right) > var\left(\Delta p_t^{AMS} \mid T - t \leq 3 \text{ weeks}\right)$

Table 14: Weekend effects

		$(\Delta p_t^{AMS})^2$					
		EIC	SSC	BoE	3% Ann	4% Ann	Obs.
Spec.	news ($N_t = 1$)	0.441	0.114	0.081	0.176	0.108	690
(1)	(sd)	(0.079)***	(0.042)***	(0.030)***	(0.057)***	(0.046)**	
	constant	0.277	0.196	0.139	0.215	0.177	493
	(sd)	(0.035)***	(0.026)***	(0.021)***	(0.031)***	(0.036)***	
Spec.	news ($N_t = 1$)	0.423	0.091	0.081	0.161	0.094	
(2)	(sd)	(0.081)**	(0.040)***	(0.031)***	(0.057)***	(0.046)*	
	weekend	0.060	0.080	-0.001	0.050	0.049	403
	(sd)	(0.106)	(0.052)	(0.034)	(0.069)	(0.048)	
	constant	0.267	0.183	0.139	0.206	0.168	493
	(sd)	(0.039)***	(0.029)***	(0.022)***	(0.034)***	(0.037)***	
	Chi^2 test:						
	news(1) = news(2)	0.34	2.43	0.00	0.50	0.97	
	(p-value)	(0.562)	(0.119)	(0.971)	(0.479)	(0.324)	

Testing for the presence of weekend effects in squared Amsterdam security returns.
Returns calculated over 2 or 3 days periods (denoted t) with or without news. The news variable ($N_t = 1$) captures the difference in variance between news and no-news observations. The constant captures the benchmark no-news variance.
A Chi^2 test on the equality of the news coeffcient in specifications (1) and (2) is presented.
***,** denotes statistical significance at the 1 and 5% level. Robust, bootstrapped standard errors (1000 replications) are reported in parentheses.

Table 15: Predictive regressions - BoE

	Panel (1): Future Amsterdam BoE returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
Current Amsterdam BoE	-0.044	-0.075	-0.055	0.023	0.061	0.166
returns (2/3 days)	(0.027)*	(0.041)*	(0.052)	(0.076)	(0.095)	(0.119)
Constant	0.028	0.056	0.084	0.165	0.248	0.334
	(0.012)**	(0.016)***	(0.019)***	(0.028)***	(0.036)***	(0.043)***
N	1536	1530	1524	1506	1488	1471
Adj. R^2	0.00	0.00	0.00	0.00	0.00	0.00
	Panel (2): Future Amsterdam BoE returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
London news BoE	0.072	0.142	0.108	0.281	0.325	0.470
returns (3/4 days)	(0.043)*	(0.069)**	(0.074)	(0.096)	(0.124)	(0.150)
Constant	0.026	0.054	0.078	0.144	0.247	0.306
	(0.016)*	(0.022)**	(0.026)***	(0.038)***	(0.050)***	(0.058)***
N	705	705	702	695	688	685
Adj. R^2	0.01	0.02	0.00	0.02	0.02	0.03
	Panel (3): Future London BoE returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
Current London BoE	-0.049	-0.106	-0.038	0.049	0.086	0.207
returns (2/3 days)	(0.045)	(0.054)**	(0.069)	(0.087)	(0.106)	(0.118)
Constant	0.029	0.054	0.081	0.165	0.235	0.311
	(0.014)**	(0.018)***	(0.021)***	(0.030)***	(0.038)***	(0.045)***
N	1156	1319	1339	1344	1344	1344
Adj. R^2	0.00	0.01	0.00	0.00	0.00	0.00

This table tests whether London news returns on BoE stock can (negatively) predict future BoE returns in Amsterdam over future periods (panel 2). London news returns are defined as the London returns between the departure of two subsequent packet boats. Future periods in Amsterdam over which returns are calculated start after the arrival of a packet and run between 2/3 days and 4 weeks. As a comparison, panel (1) and panel (2) test whether own-city 2 or 3 day returns returns (Mon-Wed, Wed-Fri, Fri-Mon) in Amsterdam and London can (negatively) predict future returns.
Robust, bootstrapped (1000 reps.) standard errors are presented in parentheses.
***,**,* denotes significance at the 10, 5, 1% level respectively.

Table 16: Predictive regressions - 3 percent Annuities

	Panel (1): Future Amsterdam 3% Ann. returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
Current Amsterdam 3%	-0.112	-0.178	-0.202	-0.150	-0.126	0.035
Ann. returns (2/3 days)	(0.033)***	(0.049)***	(0.064)***	(0.083)*	(0.104)	(0.124)
Constant	0.034	0.066	0.097	0.175	0.259	0.343
	(0.015)**	(0.019)***	(0.023)***	(0.032)***	(0.039)***	(0.046)***
N	1536	1530	1524	1506	1488	1471
Adj. R^2	0.01	0.02	0.02	0.01	0.00	0.00
	Panel (2): Future Amsterdam 3% Ann. returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
London news 3% Ann.	0.081	0.155	0.129	0.255	0.317	0.497
returns (3/4 days)	(0.052)	(0.061)**	(0.083)	(0.094)***	(0.117)***	(0.131)***
Constant	0.010	0.045	0.073	0.144	0.241	0.307
	(0.019)	(0.025)	(0.029)	(0.039)	(0.050)	(0.058)
N	863	862	857	848	838	834
Adj. R^2	0.01	0.02	0.01	0.02	0.02	0.04
	Panel (3): Future London 3% Ann. returns					
	2/3 days	4/5 days	1 week	2 weeks	3 weeks	4 weeks
Current London 3% Ann.	-0.031	-0.083	-0.059	0.035	0.064	0.191
returns (2/3 days)	(0.039)	(0.052)	(0.068)	(0.099)	(0.113)	(0.125)
Constant	0.026	0.056	0.075	0.151	0.233	0.315
	(0.013)**	(0.018)***	(0.022)***	(0.031)***	(0.039)***	(0.046)***
N	1516	1537	1539	1539	1539	1539
Adj. R^2	0.00	0.00	0.00	0.00	0.00	0.00

This table tests whether London news returns on 3% Ann. can (negatively) predict future 3% Ann. returns in Amsterdam over future periods (panel 2). London news returns are defined as the London returns between the departure of two subsequent packet boats. Future periods in Amsterdam over which returns are calculated start after the arrival of a packet and run between 2/3 days and 4 weeks. As a comparison, panel (1) and panel (2) test whether own-city 2 or 3 day returns returns (Mon-Wed, Wed-Fri, Fri-Mon) in Amsterdam and London can (negatively) predict future returns.
Robust, bootstrapped (1000 reps.) standard errors are presented in parentheses.
***,**,* denotes significance at the 10, 5, 1% level respectively.

Table 17: Observations moment conditions - simple

Moment conditions	Observations		
	EIC	BoE	3% Ann.
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t-1}^{LND}\right)$	625	625	625
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t}^{LND}\right)$	636	647	658
$cov\left(\Delta p_{t,2}^{AMS}, \Delta\widetilde{p}_{t}^{LND}\right)$	365	367	378
$var\left(\Delta p_{t,1}^{AMS}\right)$	667	667	667
$var\left(\Delta p_{t,2}^{AMS}\right)$	384	384	384

Observations of different moment equations, see table 7

Table 18: Extended structural model - GMM estimates

Parameters	EIC	BoE	3% Ann.
β	0.903	1.063	0.973
	(0.153)***	(0.172)***	(0.130)***
$\sigma^2_{\widetilde{\eta}}$	0.310	0.092	0.149
	(0.080)***	(0.018)***	(0.041)***
$\lambda_1\sigma^2_{\varepsilon}$	0.262	0.030	0.041
	(0.083)***	(0.015)**	(0.031)
$\left(\widehat{\lambda}_1 - \lambda_1 + \widehat{\lambda}_2\right)\sigma^2_{\varepsilon}$	0.144	0.091	0.065
	(0.036)***	(0.037)**	(0.048)
$\sigma^2_{w_1}$	0.131	0.052	0.151
	(0.096)	(0.035)	(0.064)
$\sigma^2_{w_2}$	0.278	0.116	0.215
	(0.051)***	(0.038)***	(0.053)
Chi^2-test: $\beta = 1$	0.40	0.13	0.04
(p-value)	(0.525)	(0.714)	(0.835)
Hansen's J-stat	1.91	3.37	1.76
(p-value)	(0.385)	(0.186)	(0.416)
total fraction unexplained	0.314	0.348	0.481

Iterative GMM estimates of moment equations:

$$cov\left(\Delta p^{AMS}_{t,1}, \Delta\widetilde{p}^{LND}_{t-2}|_{t-1,1}\right) \cup cov\left(\Delta\widetilde{p}^{AMS}_{t,2}, \Delta\widetilde{p}^{LND}_{t-1}\right) = (1-\beta)\sigma^2_{\widetilde{\eta}}$$
$$cov\left(\Delta p^{AMS}_{t,1}, \Delta\widetilde{p}^{LND}_{t-1}|_{t-1,1}\right) = \beta\sigma^2_{\widetilde{\eta}} + (1-\beta)\lambda_1\sigma^2_{\varepsilon}$$
$$cov\left(\Delta p^{AMS}_{t,1}, \Delta\widetilde{p}^{LND}_{t-1}|_{t-1,1}\&_{t-1,2}\right) = \beta\sigma^2_{\widetilde{\eta}} + (1-\beta)\left(\widehat{\lambda}_1 - \lambda_1 + \widehat{\lambda}_2\right)\sigma^2_{\varepsilon}$$
$$cov\left(\Delta p^{AMS}_{t,1}, \Delta\widetilde{p}^{LND}_{t}\right) = \beta\lambda_1\sigma^2_{\varepsilon}$$
$$cov\left(\Delta p^{AMS}_{t,2}, \Delta\widetilde{p}^{LND}_{t}\right) = \beta\left(\widehat{\lambda}_1 - \lambda_1 + \widehat{\lambda}_2\right)\sigma^2_{\varepsilon}$$
$$var\left(\Delta p^{AMS}_{t,1}|_{t-1,1}\right) = \left[\beta^2 + (1-\beta)^2\right]\left(\lambda_1\sigma^2_{\varepsilon} + \sigma^2_{\widetilde{\eta}}\right) + \sigma^2_{w_1}$$
$$var\left(\Delta p^{AMS}_{t,1}|_{t-1,2}\right) = \beta^2\left(\lambda_1\sigma^2_{\varepsilon} + \sigma^2_{\widetilde{\eta}}\right) + (1-\beta)^2\left(\widehat{\lambda}_1 - \lambda_1 + \widehat{\lambda}_2\right)\sigma^2_{\varepsilon} + \sigma^2_{w_1}$$
$$var(\Delta p^{AMS}_{t,2}) = \beta^2\left(\widehat{\lambda}_1 - \lambda_1 + \widehat{\lambda}_2\right)\sigma^2_{\varepsilon} + (1-\beta)^2\left(\lambda_1\sigma^2_{\varepsilon} + \sigma^2_{\widetilde{\eta}}\right) + \sigma^2_{w2}$$

The β measures the delayed response to news. $\beta = 1$ indicates that the Amsterdam market immediate incorporates all available news. The fraction of the overal return variance that is unexplained by publi and private information is calculated as:

$$\frac{\sigma^2_{w_1}\times N(\Delta p^{AMS}_{t,1}) + \sigma^2_{w2}\times N(\Delta p^{AMS}_{t,2})}{var\left(\Delta p^{AMS}_{t,1}\right)\times N(\Delta p^{AMS}_{t,1}) + var\left(\Delta p^{AMS}_{t,2}\right)\times N(\Delta p^{AMS}_{t,2})}$$

The weighting matrix and standard errors (in parantheses) are heteroskedasticity- and auto-correllatio consistent (using a Newey-West kernel with optimal number of lags).
***,** denotes significance at the 1, 5% level

Table 19: Observations moment conditions - extended

Moment conditions	Observations		
	EIC	BoE	3% Ann.
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t-2}^{LND}\right) \cup cov\left(\Delta p_{t,2}^{AMS}, \Delta\widetilde{p}_{t-1}^{LND}\right)$	621	632	653
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t-1}^{LND}\|_{t-1,1}\right)$	277	277	277
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t-1}^{LND}\|_{t-1,1}\&_{t-1,2}\right)$	348	348	348
$cov\left(\Delta p_{t,1}^{AMS}, \Delta\widetilde{p}_{t}^{LND}\right)$	636	647	658
$cov\left(\Delta p_{t,2}^{AMS}, \Delta\widetilde{p}_{t}^{LND}\right)$	365	367	378
$var\left(\Delta p_{t,1}^{AMS}\|_{t-1,1}\right)$	296	296	296
$var\left(\Delta p_{t,1}^{AMS}\|_{t-1,2}\right)$	371	371	371
$var(\Delta p_{t,2}^{AMS})$	384	384	384

Observations of different moment equations
See table 18