Online Appendix of
”The Importance of Being Special: Repo Markets During the Crisis” *

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1. Data and summary evidence

Table 1 **Statistics on repo transactions for repo maturity** - This table reports the average and the standard deviation of the daily distribution of the special repo transactions for repo maturity. The statistics are reported for the full sample and for three distinct sub-periods. First period from 1 October 2009 to 7 August 2011. Second period: from 8 August 2011 to 21 December 2011. Third period: from 22 December 2011 to 12 July 2012.

<table>
<thead>
<tr>
<th></th>
<th>Spot next</th>
<th></th>
<th>Tomorrow next</th>
<th></th>
<th>Over night</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>St.dev</td>
<td>Mean</td>
<td>St.dev</td>
<td>Mean</td>
</tr>
<tr>
<td>Full Sample</td>
<td>86.315</td>
<td>3.154</td>
<td>12.047</td>
<td>2.908</td>
<td>1.638</td>
</tr>
<tr>
<td>1st period</td>
<td>86.431</td>
<td>3.238</td>
<td>11.868</td>
<td>2.978</td>
<td>1.699</td>
</tr>
<tr>
<td>2nd period</td>
<td>84.869</td>
<td>2.425</td>
<td>13.620</td>
<td>2.285</td>
<td>1.509</td>
</tr>
<tr>
<td>3rd period</td>
<td>86.962</td>
<td>3.020</td>
<td>11.519</td>
<td>2.694</td>
<td>1.517</td>
</tr>
</tbody>
</table>

Table 2 **Statistics of GC and Special repo rates** - This table reports the average, the standard deviation, the 5th and 95th percentile of the daily distribution of the GC and special repo rates. Special and GC repo rates are based on spot next (SN), tomorrow next (TN) and overnight (ON) transactions. The statistics are reported for the full sample and for three distinct sub-periods. First period from 1 October 2009 to 7 August 2011. Second period: from 8 August 2011 to 21 December 2011. Third period: from 22 December 2011 to 12 July 2012 (see Section 3 for details about the variables).

<table>
<thead>
<tr>
<th></th>
<th>GC repo rates</th>
<th></th>
<th>Special repo rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>St.dev</td>
<td>5 Perc.</td>
</tr>
<tr>
<td>Full Sample</td>
<td>0.618</td>
<td>0.377</td>
<td>0.246</td>
</tr>
<tr>
<td>1st period</td>
<td>0.593</td>
<td>0.347</td>
<td>0.254</td>
</tr>
<tr>
<td>2nd period</td>
<td>1.141</td>
<td>0.197</td>
<td>0.765</td>
</tr>
<tr>
<td>3rd period</td>
<td>0.333</td>
<td>0.096</td>
<td>0.229</td>
</tr>
</tbody>
</table>
2. Model

2.1. Population measures

To solve the system, we reduce it to a simpler one in six unknowns. Adding

\[
\begin{align*}
\text{Sellers} & \quad \nu_i \mu_{bo} \mu_{li} = \pi \mu_{si} + \kappa \mu_{zi} + \lambda \mu_{bi} \mu_{zi} \\
\text{Non-searchers} & \quad \lambda \mu_{bi} \mu_{zi} = \pi \mu_{zi} + \kappa \mu_{ni}
\end{align*}
\]

we find

\[
\nu_i \mu_{bo} \mu_{li} + \bar{\kappa} (-\mu_{zi} - \mu_{zi}) + \kappa (-\mu_{zi} - \mu_{zi}) = 0.
\]

Using \(\mu_{sni} = \mu_{zi} + \mu_{zi}\) we find

\[
\mu_{sni} = \frac{\nu_i \mu_{bo} \mu_{li}}{\bar{\kappa} + \kappa}.
\]

Then, equation

\[
\mu_{ti} + \mu_{bi}^{ch} + \mu_{si} = S
\]

implies

\[
\mu_{ti} = -\mu_{bi}^{ch} + S - \mu_{si}.
\]

Plugging equation (6) into

\[
\text{Borrowers} \quad F + \sum_{i=1}^{2} \bar{\kappa} (\mu_{zi} + \mu_{zi}) = \kappa \mu_{bo} + \sum_{i=1}^{2} \nu_i \mu_{bo} \mu_{li}
\]

we find

\[
F = \frac{\kappa \mu_{ba} \left( -\nu_1 \mu_{bi}^{ch} - \nu_2 \mu_{bi}^{ch} + \bar{\kappa} + \kappa + \nu_2 S - \nu_2 \mu_{s2} + \nu_1 S - \nu_1 \mu_{s1} \right)}{\bar{\kappa} + \kappa}.
\]

Equation

\[
\text{Sellers} \quad \nu_i \mu_{bo} \mu_{li} = \pi \mu_{zi} + \kappa \mu_{zi} + \lambda \mu_{bi} \mu_{zi}
\]

implies

\[
\mu_{zi} = \frac{\nu_i \mu_{bo} \left( -\mu_{bi}^{ch} + S - \mu_{si} \right)}{\bar{\kappa} + \kappa + \lambda \mu_{bi}}.
\]

Equation

\[
\text{Non-searchers} \quad \lambda \mu_{bi} \mu_{zi} = \pi \mu_{zi} + \kappa \mu_{ni}
\]

implies

\[
\mu_{zi} = \frac{\lambda \nu_i \mu_{bi} \mu_{bo} \left( -\mu_{bi}^{ch} + S - \mu_{si} \right)}{(\bar{\kappa} + \kappa) (\bar{\kappa} + \kappa + \lambda \mu_{bi})}.
\]

Equation

\[
\text{Buyers} \quad \kappa \mu_{ni} = \pi \mu_{ni} + \lambda \mu_{bi} \mu_{si}
\]
implies
\[
\mu_{\overline{\pi}_i} = \frac{\lambda \nu_i \kappa \mu_{bi} \mu_{bo} \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right)}{(\overline{\kappa} + \kappa)(\overline{\kappa} + \kappa + \lambda \mu_{bi})(\overline{\kappa} + \lambda \mu_{si})}. \tag{14}
\]

Combining these equations to compute \( \mu_{\overline{\pi}_i} \), we find
\[
\mu_{\overline{\pi}_i} = -\frac{\nu_i \mu_{bo} \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right)}{\overline{\kappa} + \kappa + \lambda \mu_{bi}} - \mu_{\overline{\pi}_i}^b + \mu_{si}. \tag{15}
\]

Using equation

\[
\text{Sellers} \quad \kappa \mu_{ti} + \kappa \mu_{\overline{\pi}_i} = \lambda \mu_{bi} \mu_{\overline{\pi}_i} \tag{16}
\]

we find
\[
\overline{\kappa} \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right) + \frac{\nu_i \kappa \mu_{bo} \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right)}{\overline{\kappa} + \kappa + \lambda \mu_{bi}}
- \lambda \mu_{bi} \left( -\frac{\nu_i \mu_{bo} \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right)}{\overline{\kappa} + \kappa + \lambda \mu_{bi}} - \mu_{\overline{\pi}_i}^b + \mu_{si} \right) = 0
\]
and we solve for \( \mu_{bo} \)

\[
\mu_{bo} = -\frac{(\overline{\kappa} + \kappa + \lambda \mu_{bi}) (\lambda \mu_{bi} \mu_{\overline{\pi}_i}^b - \overline{\kappa} \mu_{\overline{\pi}_i} + S \overline{\kappa} - \overline{\kappa} \mu_{si} - \lambda \mu_{bi} \mu_{si})}{\nu_i (\overline{\kappa} + \lambda \mu_{bi}) \left( -\mu_{\overline{\pi}_i}^b + S - \mu_{si} \right)}. \tag{17}
\]

Simplifying equation (15) we find
\[
\mu_{\overline{\pi}_i} = \frac{\overline{\kappa} \left( -\mu_{\overline{\pi}_i}^b - \mu_{\overline{\pi}_i}^b + S \right)}{\overline{\kappa} + \lambda \mu_{bi}} \tag{18}
\]

Equation

\[
\text{Central bank seller} \quad \kappa^b \mu_{\overline{\pi}_i} = \lambda \mu_{bi} \mu_{\overline{\pi}_i}^b \tag{19}
\]
implies
\[
\mu_{\overline{\pi}_i}^b = \frac{\kappa^b \mu_{\overline{\pi}_i}}{\lambda \mu_{bi}}. \tag{20}
\]

Using equation (9) to compute \( \mu_{bo} \) we find
\[
\mu_{bo} = \frac{F (\overline{\kappa} + \kappa)}{\kappa (-\nu_1 \mu_{\overline{\pi}_i} - \nu_2 \mu_{\overline{\pi}_i} + \overline{\kappa} + \kappa + \nu_2 S - \nu_2 \mu_{si} + \nu_1 S - \nu_1 \mu_{si})}. \tag{21}
\]

We use
\[
\text{Buyers} \quad \overline{F} = \kappa_{\overline{\pi}} + \sum_{i=1}^{2} \lambda \mu_{si} \mu_{\overline{\pi}_i} \tag{22}
\]
to compute \( \mu_{\overline{\pi}} \) using \( \mu_{si} = \mu_{\overline{\pi}_i} + \mu_{\overline{\pi}_i}^b + \mu_{\overline{\pi}_i}^b \) and equations (18), (20) and (10).
We use
\[ \overline{F}^{cb} = \kappa^{cb} \mu^{cb} + \sum_{i=1}^{2} \lambda \mu_{si} \mu^{cb}_{si} \] (23)
to compute \( \mu^{cb} \) using \( \mu_{si} = \mu_{si} + \mu^{cb}_{si} + \mu_{zi} \) and equations (18), (20) and (10).

The reduced system consists of
\[
\begin{align*}
\mu_{si} &= \mu_{zi} + \mu^{cb}_{si} + \mu_{zi} \\
\mu_{bi} &= \mu_{bi} + \mu^{cb}_{bi} + \mu_{zi} \\
\lambda \mu_{si} \mu^{cb}_{si} &= \kappa^{cb} \mu^{cb}_{zi},
\end{align*}
\]
where the latter equation corresponds to the central bank holder transition equation. These are six equations (because one is for each asset), and the six unknowns are \( \{ \mu_{si}, \mu_{bi}, \mu^{cb}_{zi} \} \) for \( i \in \{1, 2\} \).

The system is numerically solved using Mathematica.
### 3. Panel regressions

Table 3 **Panel Stationary Test** - This table reports the results of the Fisher stationary test whose null hypothesis is that all the panels contain a unit root for the SMP purchase, repo imbalance, specialness, cash imbalance, bid-ask spread, available for lending variables and CDS bond (log) over the sample 8 August 2011 - 21 December 2011.

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>SMP purchase Statistic</th>
<th>SMP purchase P-value</th>
<th>Repo imbalance Statistic</th>
<th>Repo imbalance P-value</th>
<th>Specialness Statistic</th>
<th>Specialness P-value</th>
<th>Cash imbalance Statistic</th>
<th>Cash imbalance P-value</th>
<th>Bid-ask spread Statistic</th>
<th>Bid-ask spread P-value</th>
<th>Lending Statistic</th>
<th>Lending P-value</th>
<th>CDS bond (log) Statistic</th>
<th>CDS bond (log) P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inverse chi-squared</td>
<td>393.26</td>
<td>0.00</td>
<td>305.43</td>
<td>0.00</td>
<td>187.92</td>
<td>0.00</td>
<td>70.26</td>
<td>0.00</td>
<td>300.23</td>
<td>0.00</td>
<td>305.89</td>
<td>0.00</td>
<td>136.140</td>
<td>0.00</td>
</tr>
<tr>
<td>Inverse normal</td>
<td>-15.36</td>
<td>0.00</td>
<td>-13.01</td>
<td>0.00</td>
<td>-8.30</td>
<td>0.00</td>
<td>-4.42</td>
<td>0.00</td>
<td>-13.07</td>
<td>0.00</td>
<td>-12.77</td>
<td>0.00</td>
<td>-6.23</td>
<td>0.00</td>
</tr>
<tr>
<td>Inverse logit t</td>
<td>-19.43</td>
<td>0.00</td>
<td>-15.02</td>
<td>0.00</td>
<td>-8.74</td>
<td>0.00</td>
<td>-4.83</td>
<td>0.00</td>
<td>-15.07</td>
<td>0.00</td>
<td>-15.05</td>
<td>0.00</td>
<td>-6.15</td>
<td>0.00</td>
</tr>
<tr>
<td>Modified inv. chi-squared</td>
<td>29.74</td>
<td>0.00</td>
<td>21.86</td>
<td>0.00</td>
<td>11.30</td>
<td>0.00</td>
<td>6.67</td>
<td>0.00</td>
<td>21.93</td>
<td>0.00</td>
<td>21.90</td>
<td>0.00</td>
<td>6.65</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Table 4 **Correlation matrix** - This table reports the correlation matrix of all the variables used in the analysis. The statistics are reported for the full sample and the second period. Specialness and repo imbalance are based on spot next (SN) and tomorrow next (TN) transactions. The second period: from 8 August 2011 to 21 December 2011.

<table>
<thead>
<tr>
<th></th>
<th>Full sample</th>
<th>2nd period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specialness</td>
<td>Specialness</td>
</tr>
<tr>
<td></td>
<td>Repo imb.</td>
<td>Repo imb.</td>
</tr>
<tr>
<td></td>
<td>Cash imb.</td>
<td>Cash imb.</td>
</tr>
<tr>
<td></td>
<td>Bid-ask</td>
<td>Bid-ask</td>
</tr>
<tr>
<td></td>
<td>Lend.</td>
<td>Lend.</td>
</tr>
<tr>
<td></td>
<td>SMP purch.</td>
<td>SMP purch.</td>
</tr>
<tr>
<td></td>
<td>Fail-to-deliver</td>
<td>Fail-to-deliver</td>
</tr>
<tr>
<td></td>
<td>CDS bond (log)</td>
<td>CDS bond (log)</td>
</tr>
<tr>
<td>Specialness</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Repo imb.</td>
<td>0.091 1.000</td>
<td>0.155 1.000</td>
</tr>
<tr>
<td>Cash imb.</td>
<td>-0.022 -0.011 1.000</td>
<td>-0.015 -0.054 1.000</td>
</tr>
<tr>
<td>Bid-ask</td>
<td>-0.012 -0.008 0.027 1.000</td>
<td>-0.023 -0.006 0.010 1.000</td>
</tr>
<tr>
<td>Lending</td>
<td>-0.138 0.044 0.013 -0.040 1.000</td>
<td>-0.181 -0.007 0.024 -0.033 1.000</td>
</tr>
<tr>
<td>SMP purch.</td>
<td>0.069 0.004 0.014 -0.006 -0.030 1.000</td>
<td>0.050 0.048 0.040 -0.023 -0.032 1.000</td>
</tr>
<tr>
<td>Fail-to-deliver</td>
<td>0.434 0.122 -0.034 -0.017 0.073 0.005 1.000</td>
<td>0.346 0.169 -0.061 -0.010 -0.051 0.016 1.000</td>
</tr>
<tr>
<td>CDS bond (log)</td>
<td>0.198 -0.068 0.008 -0.017 -0.127 0.108 0.049 1.000</td>
<td>0.220 -0.074 0.002 0.005 -0.184 -0.013 0.006 1.000</td>
</tr>
</tbody>
</table>
Table 5 Specialness and SMP purchases with CCP margin instead of CDS bond
- The table shows the results of OLS (Columns (1) – (2)) and quantile (Columns (3) – (4)) panel regressions with bond fixed effects. Specialness is expressed in basis points and is based on spot next (SN) and tomorrow next (TN) transactions. The repo imbalance is based on spot next (SN) and tomorrow next (TN) transactions. The repo imbalance, cash imbalance, available for lending and SMP purchase variables are rescaled by the nominal outstanding amount of the bond, expressed in percentage terms and are lagged by one day (see Section 3.1 for details). Bond time-to-maturity denotes the time-to-maturity of a specific security. Bid-ask spread denotes the bid-ask spread based on BGN Bloomberg prices at or before 5pm. D. Auction is a dummy variable to control for the date of a primary issuance of the security. CCP margins variable is bond-specific and lagged by one day. In Column (2) the observations on the 10– year on-the-run bonds are excluded from the sample. Standard errors are in parenthesis and are clustered by bond identifier (Columns (1) – (2))). The results are reported for the sub-period 8 August 2011 - 21 December 2011. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***)

<table>
<thead>
<tr>
<th></th>
<th>(1) OLS</th>
<th>(2) OLS</th>
<th>(3) Q-70</th>
<th>(4) Q-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialness (lag)</td>
<td>0.802***</td>
<td>0.800***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.090)</td>
<td>(0.099)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repo imbalance</td>
<td>1.133**</td>
<td>0.569</td>
<td>0.954***</td>
<td>4.007***</td>
</tr>
<tr>
<td></td>
<td>(0.525)</td>
<td>(0.347)</td>
<td>(0.257)</td>
<td>(0.688)</td>
</tr>
<tr>
<td>Cash imbalance</td>
<td>-1.986***</td>
<td>-1.336***</td>
<td>-2.671***</td>
<td>-5.034*</td>
</tr>
<tr>
<td></td>
<td>(0.738)</td>
<td>(0.472)</td>
<td>(1.004)</td>
<td>(2.685)</td>
</tr>
<tr>
<td>Avail. lending</td>
<td>-0.466**</td>
<td>-0.477**</td>
<td>-1.790***</td>
<td>-3.088***</td>
</tr>
<tr>
<td></td>
<td>(0.202)</td>
<td>(0.207)</td>
<td>(0.185)</td>
<td>(0.495)</td>
</tr>
<tr>
<td>Bond time-to-mat.</td>
<td>-0.082</td>
<td>-0.077</td>
<td>-0.351***</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>(0.065)</td>
<td>(0.067)</td>
<td>(0.092)</td>
<td>(0.246)</td>
</tr>
<tr>
<td></td>
<td>(2.677)</td>
<td>(2.865)</td>
<td>(6.724)</td>
<td>(17.986)</td>
</tr>
<tr>
<td>Bid-ask spread</td>
<td>-0.005</td>
<td>-0.009</td>
<td>-0.017</td>
<td>-0.136</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.023)</td>
<td>(0.107)</td>
<td>(0.286)</td>
</tr>
<tr>
<td>CCP margin</td>
<td>45.536**</td>
<td>43.956**</td>
<td>203.309***</td>
<td>173.414***</td>
</tr>
<tr>
<td></td>
<td>(18.173)</td>
<td>(18.953)</td>
<td>(17.850)</td>
<td>(47.743)</td>
</tr>
<tr>
<td>SMP purchase</td>
<td>4.614***</td>
<td>5.169***</td>
<td>5.060***</td>
<td>15.610***</td>
</tr>
<tr>
<td></td>
<td>(0.803)</td>
<td>(1.576)</td>
<td>(1.428)</td>
<td>(3.819)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.890**</td>
<td>5.869**</td>
<td>29.795***</td>
<td>58.995***</td>
</tr>
<tr>
<td></td>
<td>(2.645)</td>
<td>(2.807)</td>
<td>(1.091)</td>
<td>(2.918)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.745</td>
<td>0.739</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Num. Obs.</td>
<td>4830</td>
<td>4742</td>
<td>4830</td>
<td>4830</td>
</tr>
</tbody>
</table>
4. Panel VAR

4.1. Alternative ordering: SMP purchase ordered last

Panel A - CDS bond

Fig. 1. Panel VAR Cumulative IRFs - CDS bond The figure plots the cumulative impulse response functions to a CDS bond shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 2. Panel VAR Cumulative IRFs - Cash imbalance  The figure plots the cumulative impulse response functions to a cash imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 3. **Panel VAR Cumulative IRFs - Bid-ask spread** The figure plots the cumulative impulse response functions to a bid-ask spread shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 4. Panel VAR Cumulative IRFs - SMP purchase  The figure plots the cumulative impulse response functions to a SMP purchase shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 5. Panel VAR Cumulative IRFs - Repo imbalance The figure plots the cumulative impulse response functions to a repo imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 6. Panel VAR Cumulative IRFs - Specialness  The figure plots the cumulative impulse response functions to a specialness shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 7. Panel VAR Cumulative IRFs - Available lending The figure plots the cumulative impulse response functions to a available for lending shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
4.2. Without 10-year on-the-run bonds

Panel A - CDS bond

Fig. 8. Panel VAR Cumulative IRFs - CDS bond The figure plots the cumulative impulse response functions to a CDS bond shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 9. **Panel VAR Cumulative IRFs - Cash imbalance**  The figure plots the cumulative impulse response functions to a cash imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 10. Panel VAR Cumulative IRFs - Bid-ask spread  The figure plots the cumulative impulse response functions to a bid-ask spread shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 11. **Panel VAR Cumulative IRFs - SMP purchase**  The figure plots the cumulative impulse response functions to a SMP purchase shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 12. Panel VAR Cumulative IRFs - Repo imbalance The figure plots the cumulative impulse response functions to a repo imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Panel F - Specialness

**Fig. 13. Panel VAR Cumulative IRFs - Specialness** The figure plots the cumulative impulse response functions to a specialness shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 14. **Panel VAR Cumulative IRFs - Available lending** The figure plots the cumulative impulse response functions to a available lending shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CDS bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
4.3. CCP margin (instead of CDS bond)

Panel A - CCP margin

Fig. 15. Panel VAR Cumulative IRFs - CCP margin The figure plots the cumulative impulse response functions to a CCP margin shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP bond, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 16. Panel VAR Cumulative IRFs - Cash imbalance The figure plots the cumulative impulse response functions to a cash imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Panel C - Bid-ask spread

Fig. 17. **Panel VAR Cumulative IRFs - Bid-ask spread** The figure plots the cumulative impulse response functions to a bid-ask spread shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 18. Panel VAR Cumulative IRFs - SMP purchase  The figure plots the cumulative impulse response functions to a SMP purchase shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Panel VAR Cumulative IRFs - Repo imbalance

The figure plots the cumulative impulse response functions to a repo imbalance shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Fig. 20. **Panel VAR Cumulative IRFs - Specialness** The figure plots the cumulative impulse response functions to a specialness shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.
Panel G - Available lending

Fig. 21. Panel VAR Cumulative IRFs - Available lending The figure plots the cumulative impulse response functions to a available for lending shock of 1% and 90% bootstrapped confidence intervals (grey dashed lines) based on 1,000 replications. The cumulative impulse response functions are estimated from a panel VAR model in first-difference including the following variables: CCP margin, cash imbalance, bid-ask spread, SMP purchase, repo imbalance, specialness and available for lending of the bonds purchased under the SMP from 8 August 2011 to 21 December 2011.