

The Financial Mathematics and Computation Cluster (FMC) was established in 2009. The FMC is funded by Science Foundation Ireland and the Industry. Further details about the FMC can be found in the appendix and on the [FMC website](#). Note: Most databases are located in terminals in the Financial Data room and some can be accessed remotely.



### **The Mercato dei Titoli di Stato(MTS) Database**

The FMC's subscription (a one-off for Historical data) to the MTS database contains high frequency data for cash assets organized in monthly files. The static subscription's coverage is limited to 4 categories:

1. Best Proposals – This category includes the 3 best bid and ask prices/yields for specified bonds in the specified markets at various times.
2. Fills – This category contains details of orders that were (partly or completely) filled including the type, price, size, yield, sequence and status of the trade and other pertinent details for specified bonds in the specified markets at various times.
3. Bond Reference – This category provides information about the specified bonds pertaining to their types, maturities, coupon rates, benchmarks, issuer details, conventions, yields, trade related timings, spread, quantities, etc. in the specified markets at various times.
4. Market Calendar – This category provides information on the market affected by the event, the trading date and a description of the event for specified bonds in the specified markets at various times.

For each of these categories, data can be accessed for the time period ranging from 2011 to 2019.

### **Getting started with MTS**

The database is accessible through a shared Google Drive containing all the files the FMC is subscribed to (organized by category). This Google Drive also contains code written by the Financial Database Management Group of the FMC to scrape all the data directly from an HTTPS link to the FTP server/portal in both Python and R, which can be appropriately modified to suit user needs<sup>1</sup>. Access to the

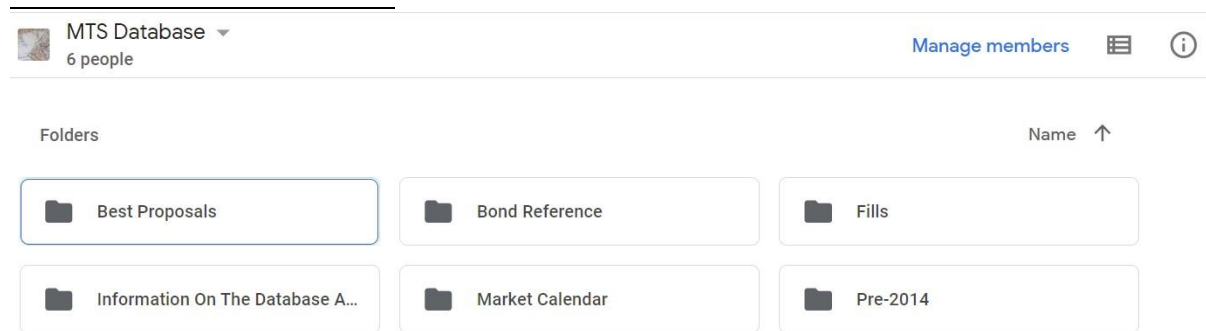
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<sup>1</sup> The code can be attributed to the group members Iason Kynigakis (Post-Doctoral Researcher, UCD) who wrote the web scraping code in R and Kushagra Jain (Doctor of Philosophy student, UCD) who wrote the web scraping code in Python.

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Google Drive (shown below) can be facilitated by contacting Ioannis Ropotos (ioannis.ropotos@ucd.ie)



For a more comprehensive overview, kindly refer to the Data Definition file in the References section below, which can be found in the shared Google Drive.

## References



**MTS Time Series -  
Data Definition.pdf**

The above file provides MTS' Time Series Market and Data Description for the European Bond and Repo Database. It is the 7<sup>th</sup> version of the document and was issued in October 2019. It provides an overall Data Mapping guide to all the data contained in the MTS database for Daily Files (for Rolling subscriptions) and Monthly Files (for Historical Data subscriptions – one-offs): the FMC is subscribed to the latter for Cash High Frequency Data within the sub category of Cash Trade-by-Trade Data<sup>2</sup>. Within the reference data, cross sectional file tables describe the variables that are included in their respective cross sectional files. Note that a single bond may have multiple entries for two reasons. First the value of a variable may need updating and second some bonds trade in more than one market. In the former case multiple entries would be characterised by multiple reference dates. In the latter case a bond has more than one market code. Therefore, it is also possible to have more than one entry per bond code depending on the market code.

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<sup>2</sup> Note: Cancelled trades are not included in the database.

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Each table has 5 columns: Variable, Type, Description, Notes and Example. The number of rows depends upon the number of variables contained in the relevant category. Lastly, detailed appendices provide additional minutiae about the tables for an all-encompassing picture.

**Industry**

FMC<sup>2</sup> has developed successful research collaborations with international and domestic financial services companies and organisations. These help ensure the industry relevance of FMC<sup>2</sup>'s research.

FMC<sup>2</sup> works with multiple external partners including Bank of Ireland, Deloitte Ireland, Citibank Europe, The Institute of Banking, Avolon, AerCap, GECAS, SNECMA, SMBC Aviation Capital and KPMG Ireland.

The formal collaboration between this research cluster and the private sector leads creates a benefit-in-kind situation where company sponsorship creates funding for research projects. In turn the companies benefit from research expertise from FMC<sup>2</sup> members and access to a pipeline of trained quality researchers.

**Who are we?**

The academic principal investigators and funded investigators involved are:  
John Cotter (Director, UCD)  
Don Bredin (UCD)  
Gregory Connor (Maynooth University)  
Paolo Guasoni (DCU)  
Julie Byrne (UCD)  
Thomas Conlon (UCD)  
Cal Muckley (UCD)  
Conall O'Sullivan (UCD)

The cluster supports a research cluster manager and a team of postdoc and PhD researchers based at UCD, DCU and Maynooth University.

**Contact us:**

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### Financial Mathematics and Computation Cluster (FMC<sup>2</sup>)

FMC<sup>2</sup> is a research collaboration between Industry, University College Dublin, Dublin City University and Maynooth University. This research group brings together complementary expertise in financial mathematics, financial economics and computational finance to create a holistic research programme in asset and risk management.

In addition to providing support for the innovation activities of Irish-based international financial companies, a pivotal outcome of the activities of FMC<sup>2</sup> is the creation of a supply of highly skilled personnel, trained postdoctoral researchers and PhD graduates, with world-class quantitative modelling skills who will support the future growth of financial service exports.

FMC<sup>2</sup> is funded by Science Foundation Ireland's Strategic Partnership programme. The object of this programme is to create partnerships between academia and industry in order to address crucial research questions, and to support the growth of research and development capacity in companies located in Ireland.

#### The Vision

*The objective of FMC<sup>2</sup> is to create a globally recognised research centre that will provide a critical underpinning for the future development of the international financial services sector in Ireland.*

<b>VAR</b>	<ul style="list-style-type: none"> <li>• Factor Modelling</li> <li>• Dynamic Factor Structure of European Security Market Return</li> <li>• Risk Measures, Connectivity and Impact on the Real Economy</li> </ul>
<b>Valuation</b>	<ul style="list-style-type: none"> <li>• Pricing Real Assets – Finalization, Policy and Market Implications</li> <li>• Aircraft Finance and Leasing</li> <li>• Energy prices and the Impact on Investment Decisions</li> <li>• Valuation of contracts with embedded inflation linked options</li> </ul>
<b>Risk</b>	<ul style="list-style-type: none"> <li>• Operational Risk – Measurement and Mitigation</li> <li>• Measuring and mitigating operational risks in financial institutions</li> <li>• Operational Risk in LIBOR and other Benchmark Markets</li> <li>• Rogue Trading and Banking</li> </ul>

[www.fmc-cluster.org](http://www.fmc-cluster.org)