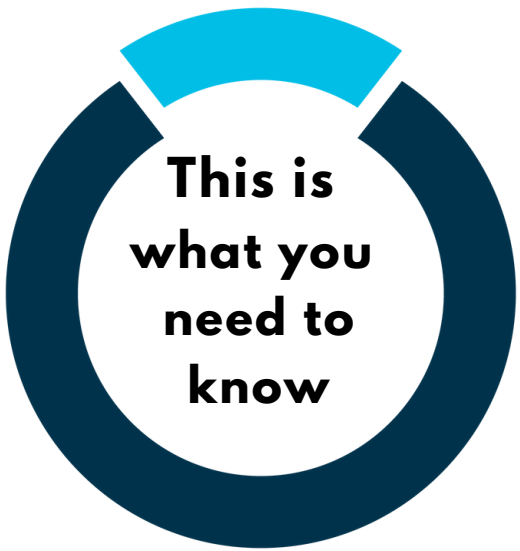
So, you're ready to graduate...

Choose a professor whose course you have passed

60 days before graduation: Let us know the name of your Supervisor

Delphi registration opens 45 days before graduation

PAY ATTENTION TO DEADLINES!!!



Thesis length:
15,000 - 25,000 words

Presentation length:
10-15 minutes (TBD)

After graduation celebration:
please respect the rules

Ask questions
Better safe than sorry!

Mastering Your Thesis: Writing Strategies, Presentation Preparation and the use of AI

What to do and what not to do

Where to start

How do I choose the topic/supervisor?

Focus on the courses that you like the most and ask the professors what it means to do a master's thesis with them.
If you already have an idea or project in mind, submit your proposal to the professor you think is closest to the topics of interest.

Introductory concepts

What is a Master Thesis

A document in which you present your original research.
Main pillars:

- must be clear and readable;
- must be rigorous and scientifically sound;
- original contribution.

Not an easy task. The document shall contain:

- reference literature;
- equations;
- graphs & tables;

How do we manage such complexity efficiently? LaTeX.

What's LaTeX ?

The standard markup language of any scientific document.

How do I obtain it? Windows version.

- Download MiKTeX from `https://miktex.org/download`.

- After the download is complete, run the installer.
- Run the update wizard (from the Windows start menu).
- Run TeXworks, which is your LaTeX editor.

How do I obtain it? Mac version.

- Visit `https://tug.org/mactex/`.

- Download the MacTeX.pkg file (read the instructions!) and follow the installation wizard.
- Run Tex Live Utility for updates.
- Run TeXShop, which is your LaTeX editor.

Overleaf

As an alternative, log in with your uniroma2 account to

`https://www.overleaf.com`

to edit your LaTeX document from your browser.

The structure

Introduction & positioning

Start your document by letting the reader know which is the problem/research question you want to tackle.

- Use concise (short and clear sentences!) and polished English. Write it yourself first, and **THEN** check the grammar with AI!
- You are not the first one for sure!
  Literature positioning: how your research situates within the existing body of knowledge.
- The use of BibTeX is highly recommended.

The structure

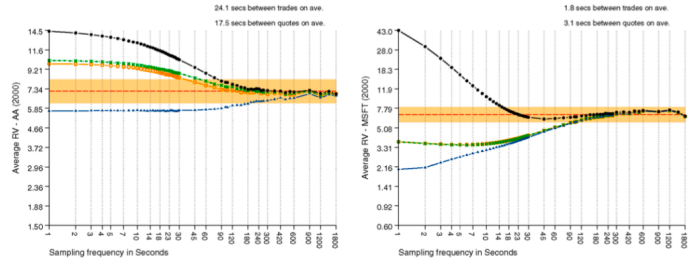
THE CORE & CONCLUSIONS

It contains your original contribution.

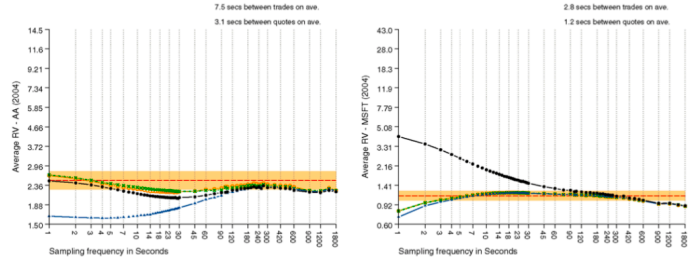
- As for introduction: use concise and polished English.
- Avoid writing as if it were your personal diary, detailing all the attempts you made.
- Include only what is truly original, avoiding unnecessary steps that may burden the reading and understanding: your goal is to effectively communicate a message/result. There is no need to include all the reasoning and trials you went through!
- Use the power of LaTeX to create a clear and consistent mathematical background.
- Summarize your result in the conclusions and remember: it is better to have 60 well-written pages than 160 of garbage.

Some tips

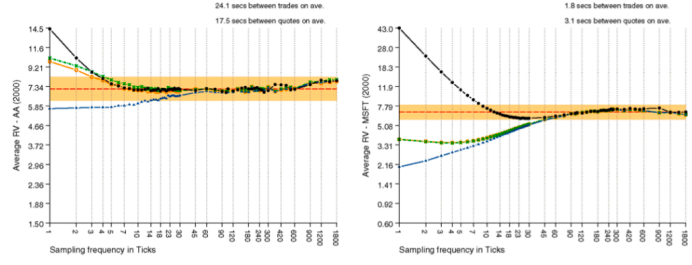
- All formulas must be consistent: once you define a quantity, you cannot change the symbol!
- You cannot refer to something that is defined later in the text.
- Be sure to have fully understood all the formulas you use: someone may ask the meaning...
- Graphs and tables should be readable, and the caption below must be exhaustive.


24.1 secs between trades on ave.
17.5 secs between quotes on ave.
Average RV - AA (2000)
Sampling frequency in Seconds

1.8 secs between trades on ave.
3.1 secs between quotes on ave.
Average RV - MSFT (2000)
Sampling frequency in Seconds


7.5 secs between trades on ave.
3.1 secs between quotes on ave.
Average RV - AA (2004)
Sampling frequency in Seconds

2.8 secs between trades on ave.
1.2 secs between quotes on ave.
Average RV - MSFT (2004)
Sampling frequency in Seconds


24.1 secs between trades on ave.
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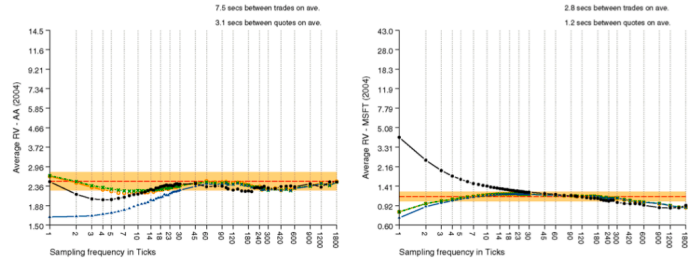
Average RV - AA (2000)
Sampling frequency in Ticks

1.8 secs between trades on ave.
3.1 secs between quotes on ave.
Average RV - MSFT (2000)
Sampling frequency in Ticks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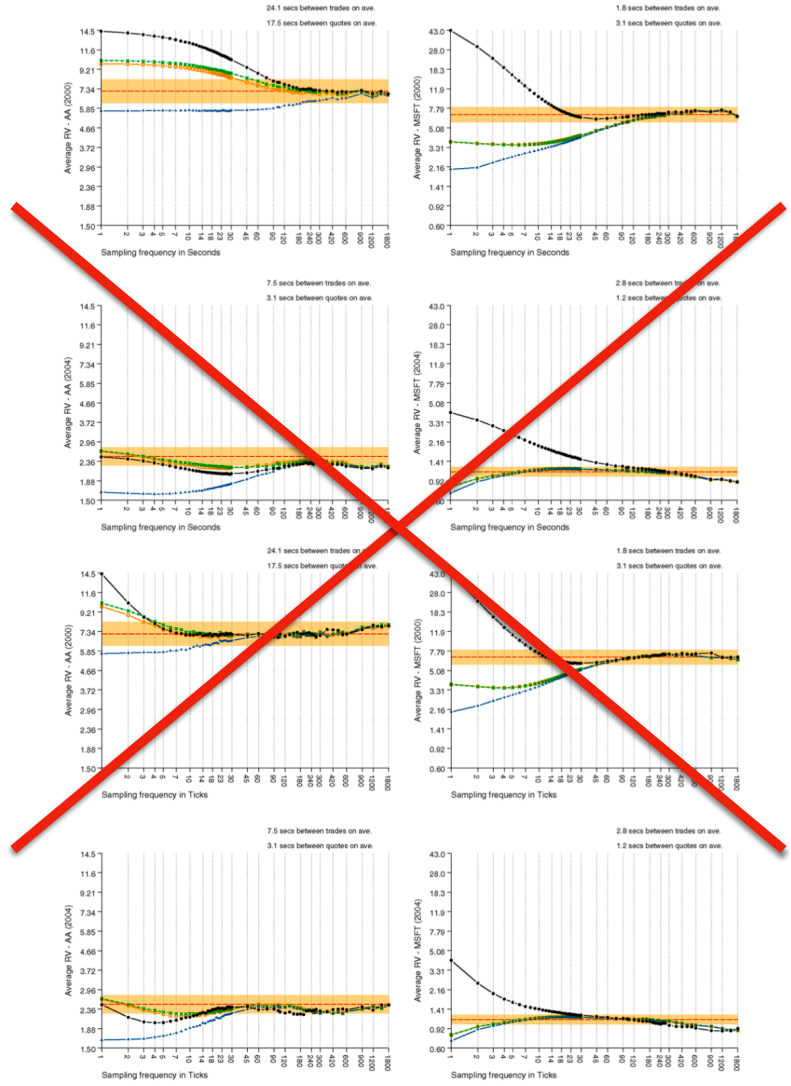
Average RV - AA (2004)
Sampling frequency in Ticks

2.8 secs between trades on ave.
1.2 secs between quotes on ave.
Average RV - MSFT (2004)
Sampling frequency in Ticks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Sampling frequency in Seconds
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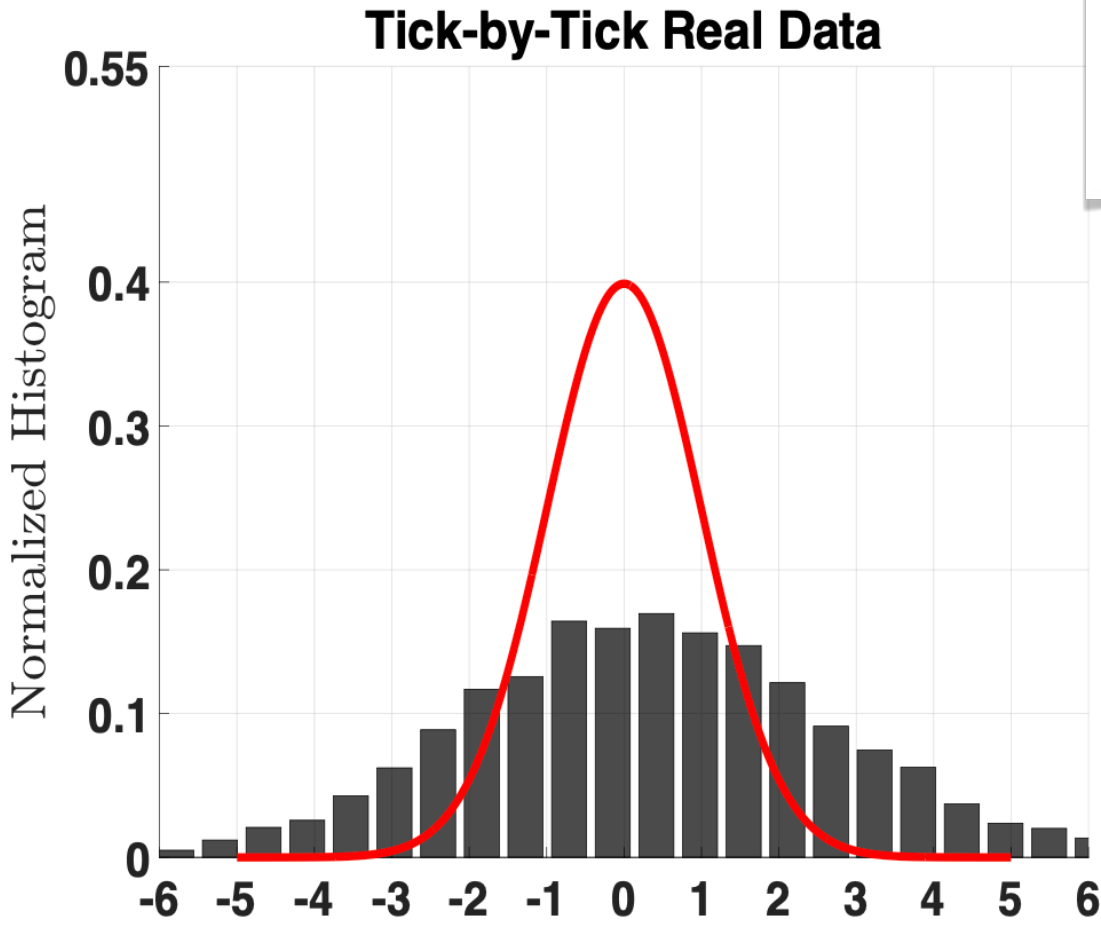
Sampling frequency in Ticks


Tick-by-Tick Real Data
Normalized Histogram
0.55
0.4
0.3
0.2
0.1
0
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6


APPROVED

The presentation

- Typically 10-15 minutes.
- Use Beamer, the LaTeX environment for presentations.
- Prepare for a general audience: if you truly master the subject, you should be able to explain it to your grandchildren, **rigorously**.
- Avoid slides with plenty of written stuff, numbers or formulas!
- If you introduce a formula, you must explain it ⇒ do you have enough time for all of them?
- If you introduce a table: 1) it must be readable, and 2) you must have time to discuss it.
- Prepare a speech and check the English pronunciation!
- I do not recommend the use of icons/silly images/frills:

Not to put in the presentation: an overloaded table

Row	Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8	Col9	Col10	Col11	Col12	Col13	Col14
1	5.67	2.34	8.91	6.45	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65
2	3.21	7.65	1.98	4.32	8.76	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23
3	6.54	1.23	9.87	2.34	5.67	8.91	3.21	7.89	4.56	0.54	2.76	8.34	5.43	7.65
4	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76
5	8.91	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.67	2.34	5.43	7.65	6.45
6	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	2.19	5.43	6.54	0.98	8.76
7	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65	6.54	8.91	3.21	7.89	4.56	5.67
8	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76	2.19	0.98	7.87	9.09	3.45	6.54
9	0.54	2.76	8.34	5.43	7.65	6.45	8.91	3.21	7.89	4.56	1.23	9.87	0.54	2.76
10	3.21	7.65	1.98	4.32	8.76	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23
11	5.43	7.65	6.45	8.91	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.67	2.34
12	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76
13	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65	6.54	8.91	3.21	7.89	4.56	5.67
14	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	2.19	5.43	6.54	0.98	8.76
15	8.91	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.67	2.34	5.43	7.65	6.45
16	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76	2.19	0.98	7.87	9.09	3.45	6.54
17	5.67	2.34	8.91	6.45	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65
18	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76
19	6.54	1.23	9.87	2.34	5.67	8.91	3.21	7.89	4.56	0.54	2.76	8.34	5.43	7.65
20	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	2.19	5.43	6.54	0.98	8.76
21	8.91	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.67	2.34	5.43	7.65	6.45
22	3.21	7.65	1.98	4.32	8.76	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23
23	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65	6.54	8.91	3.21	7.89	4.56	5.67
24	2.19	5.43	6.54	0.98	7.87	9.09	3.45	6.78	1.23	3.21	7.65	1.98	4.32	8.76
25	5.67	2.34	8.91	6.45	3.21	7.89	4.56	1.23	9.87	0.54	2.76	8.34	5.43	7.65

Table: Comprehensive Data Analysis (2001-2010)

Not to put in the presentation: an overloaded slide of complex formulas

In our research, we have derived several advanced equations. Consider that

$$F(\boldsymbol{x}) = \int_{\Omega} K(\boldsymbol{x}, \boldsymbol{\xi}) \phi(\boldsymbol{\xi}) \, d\boldsymbol{\xi} + \sum_{i=1}^{N} \lambda_i \psi_i(\boldsymbol{x}) \tag{1}$$

but since we also have

$$\mathcal{T} = \bigotimes_{k=1}^{n} \left(\int_{a_k}^{b_k} \phi_k(u_k) \, du_k \right) + \sum_{i,j=1}^{n} \alpha_{ij} \, \boldsymbol{e}_i \otimes \boldsymbol{e}_j \tag{2}$$

which leads to

$$G(\boldsymbol{y}) = \int_0^T \left[\int_{\Gamma} f\left(\boldsymbol{y}(t), \boldsymbol{\eta}\right) d\mu(\boldsymbol{\eta}) \right] dt + \beta \sum_{k=1}^{M} \left(\int_{\Delta_k} h_k(\boldsymbol{y}(s)) \, ds \right)^2 \tag{3}$$

Finally considering that

$$u(\boldsymbol{x}, t) = \sum_{n=1}^{\infty} \sum_{m=1}^{\infty} A_{nm} \sin\left(\frac{n\pi x}{L}\right) \sin\left(\frac{m\pi y}{W}\right) e^{-\left(\frac{n^2}{L^2} + \frac{m^2}{W^2}\right)\kappa t} \tag{4}$$

we obtain

$$J[\phi] = \frac{1}{2} \int_{\Omega} \left(\nabla \phi(\boldsymbol{x}) \cdot \mathbf{A}(\boldsymbol{x}) \nabla \phi(\boldsymbol{x}) \right) d\boldsymbol{x} - \int_{\Omega} B(\boldsymbol{x}) \phi(\boldsymbol{x}) \, d\boldsymbol{x} + \gamma \int_{\partial\Omega} \phi(\boldsymbol{x}) \, dS \tag{5}$$

An economic lens: cross-sectional pricing

Fama-MacBeth

This paper

$$
\begin{aligned}
r_{j,t+1} = \alpha_{0,t} &+ \beta_{1,t}\ \sqrt{\mathrm{TRV}^c_{j,t}} \\
&+ \beta_{2,t}\ \mathrm{TS}^c_{j,t} + \beta_{3,t}\ \mathrm{TK}^c_{j,t} \\
&+ \beta_{4,t}\ \mathrm{J}^{(+)}_{j,t} + \beta_{5,t}\ \mathrm{J}^{(-)}_{j,t} \\
&+ \beta_{6,t}\ \mathrm{RZ}_{j,t} \\
&+ \beta_{7,t}\ \mathrm{Ami}_{j,t} + \beta_{8,t}\ \mathrm{RSJ}_{j,t} + \beta_{9,t}\ \mathrm{R}_{j,t} + \varepsilon_{j,t+1}.
\end{aligned}
$$

An economic lens: cross-sectional pricing

Fama-MacBeth

Explain the regressor.

This paper

$$
\begin{aligned}
r_{j,t+1} = \alpha_{0,t} &+ \beta_{1,t} \sqrt{\mathrm{TRV}^c_{j,t}} \\
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&+ \beta_{6,t}\ \mathrm{RZ}_{j,t} \\
&+ \beta_{7,t}\ \mathrm{Ami}_{j,t} + \beta_{8,t}\ \mathrm{RSJ}_{j,t} + \beta_{9,t}\ \mathrm{R}_{j,t} + \varepsilon_{j,t+1}.
\end{aligned}
$$

An economic lens: cross-sectional pricing

Fama-MacBeth

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This paper

$$r_{j,t+1} = \alpha_{0,t} + \beta_{1,t}\sqrt{\mathrm{TRV}^c_{j,t}} + \beta_{2,t}\mathrm{TS}^c_{j,t} + \beta_{3,t}\mathrm{TK}^c_{j,t} + \beta_{4,t}\mathrm{J}^{(+)}_{j,t} + \beta_{5,t}\mathrm{J}^{(-)}_{j,t} + \beta_{6,t}\mathrm{RZ}_{j,t} + \beta_{7,t}\mathrm{Ami}_{j,t} + \beta_{8,t}\mathrm{RSJ}_{j,t} + \beta_{9,t}\mathrm{R}_{j,t} + \varepsilon_{j,t+1}.$$

An economic lens: cross-sectional pricing

Fama-MacBeth

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This paper

$$r_{j,t+1} = \alpha_{0,t} + \beta_{1,t}\sqrt{\mathrm{TRV}^c_{j,t}} + \beta_{2,t}\,\mathrm{TS}^c_{j,t} + \beta_{3,t}\,\mathrm{TK}^c_{j,t} + \beta_{4,t}\,\mathrm{J}^{(+)}_{j,t} + \beta_{5,t}\,\mathrm{J}^{(-)}_{j,t} + \beta_{6,t}\,\mathrm{RZ}_{j,t} + \beta_{7,t}\,\mathrm{Ami}_{j,t} + \beta_{8,t}\,\mathrm{RSJ}_{j,t} + \beta_{9,t}\,\mathrm{R}_{j,t} + \varepsilon_{j,t+1}.$$

An economic lens: cross-sectional pricing

Fama-MacBeth

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&+ \beta_{4,t}\ \mathrm{J}^{(+)}_{j,t} + \beta_{5,t}\ \mathrm{J}^{(-)}_{j,t} \\
&+ \beta_{6,t}\ \mathrm{RZ}_{j,t} \\
&+ \beta_{7,t}\ \mathrm{Ami}_{j,t} + \beta_{8,t}\ \mathrm{RSJ}_{j,t} + \beta_{9,t}\ \mathrm{R}_{j,t} + \varepsilon_{j,t+1}.
\end{aligned}
$$

An economic lens: cross-sectional pricing

Fama-MacBeth

This paper

$$
\begin{aligned}
r_{j,t+1} \quad = \quad \alpha_{0,t} \quad & + \boxed{\begin{matrix}\mathbf{-0.07}\\(\mathbf{3.5})\end{matrix}} \sqrt{\mathsf{TRV}^{c}_{j,t}} \\
& + \boxed{\begin{matrix}0.03\\(1.9)\end{matrix}} \mathsf{TS}^{c}_{j,t} + \boxed{\begin{matrix}-0.01\\(1.1)\end{matrix}} \mathsf{TK}^{c}_{j,t} \\
& + \boxed{\begin{matrix}\mathbf{-0.03}\\(\mathbf{3.3})\end{matrix}} \mathsf{J}^{(+)}_{j,t} + \boxed{\begin{matrix}\mathbf{-0.03}\\(\mathbf{2.7})\end{matrix}} \mathsf{J}^{(-)}_{j,t} \\
& + \boxed{\begin{matrix}\mathbf{0.41}\\(\mathbf{3.7})\end{matrix}} \mathsf{RZ}_{j,t} \\
& + \boxed{\begin{matrix}-0.26\\(0.8)\end{matrix}} \mathsf{Ami}_{j,t} + \boxed{\begin{matrix}-0.05\\(0.7)\end{matrix}} \mathsf{RSJ}_{j,t} + \boxed{\begin{matrix}\mathbf{-1.83}\\(\mathbf{5.9})\end{matrix}} \mathsf{R}_{j,t} + \varepsilon_{j,t+1}.
\end{aligned}
$$

An economic lens: cross-sectional pricing

Fama-MacBeth

Comment the result and provide insightful interpretation.

This paper

$$
\begin{aligned}
r_{j,t+1} = \alpha_{0,t} &+ \underset{(\mathbf{3.5})}{\boxed{\mathbf{-0.07}}} \sqrt{\mathsf{TRV}^c_{j,t}} \\
&+ \underset{(1.9)}{\boxed{0.03}} \mathsf{TS}^c_{j,t} + \underset{(1.1)}{\boxed{-0.01}} \mathsf{TK}^c_{j,t} \\
&+ \underset{(\mathbf{3.3})}{\boxed{\mathbf{-0.03}}} \mathsf{J}^{(+)}_{j,t} + \underset{(\mathbf{2.7})}{\boxed{\mathbf{-0.03}}} \mathsf{J}^{(-)}_{j,t} \\
&+ \underset{(\mathbf{3.7})}{\boxed{\mathbf{0.41}}} \mathsf{RZ}_{j,t} \\
&+ \underset{(0.8)}{\boxed{-0.26}} \mathsf{Ami}_{j,t} + \underset{(0.7)}{\boxed{-0.05}} \mathsf{RSJ}_{j,t} + \underset{(\mathbf{5.9})}{\boxed{\mathbf{-1.83}}} \mathsf{R}_{j,t} + \varepsilon_{j,t+1}.
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$$
\begin{aligned}
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&+ \boxed{\underset{(1.9)}{0.03}} \mathsf{TS}^c_{j,t} + \boxed{\underset{(1.1)}{-0.01}} \mathsf{TK}^c_{j,t} \\
&+ \boxed{\underset{(\mathbf{3.3})}{\mathbf{-0.03}}} \mathsf{J}^{(+)}_{j,t} + \boxed{\underset{(\mathbf{2.7})}{\mathbf{-0.03}}} \mathsf{J}^{(-)}_{j,t} \\
&+ \boxed{\underset{(\mathbf{3.7})}{\mathbf{0.41}}} \mathsf{RZ}_{j,t} \\
&+ \boxed{\underset{(0.8)}{-0.26}} \mathsf{Ami}_{j,t} + \boxed{\underset{(0.7)}{-0.05}} \mathsf{RSJ}_{j,t} + \boxed{\underset{(\mathbf{5.9})}{\mathbf{-1.83}}} \mathsf{R}_{j,t} + \varepsilon_{j,t+1}.
\end{aligned}
$$

Use of AI

You must learn how to master AI at your **real** advantage. In this respect:

- first, be careful with the free version of your favorite AI; it's prone to hallucinations.
  Paid subscriptions can be **significantly** more precise and profound (this is not a sponsor for AI, just a statement of facts).
- Second: if you use AI as a black box that works for you, and you just copy and paste, you will have two main consequences:
  1. You will be caught by your supervisor. He/She is not going to defend your position within the **Graduation Committee**, resulting in a final mark that can be very disappointing for you.
  2. You are only deceiving yourself. If you dont take advantage of this opportunity to acquire new skills and improve yourself, if you let an AI outperform you, the world out there will prefer the AI over you.

Use of AI: caveats and examples

My projects require an unexpectedly mathematically advanced topic:

- **Before AI**: turn to something simpler.
- **Nowadays**: Interrogate the AI on the topic; Let the AI explain the topic to you, study it, and keep going until you truly master it.
  Result:
  1. You can answer questions (from supervisor and/or graduation committee) on the topic with confidence.
  2. You have expanded your knowledge, and the AI has pushed you forward ... rather than you pushing the AI ahead of yourself (to your own disadvantage).

Same caveats apply to:

1. Writing codes (MATLAB, Python, ...) for your projects.
2. Writing the chapters of your manuscript.

Final marks (last 3 years of data)

77	78																			
78	80																			
79	81																			
80	84	85																		
81	85																			
84	86	89																		
85	86																			
86	89	90																		
89	92																			
91	95	96	96	96																
92	96	97																		
93	97																			
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96	100	100	101																	
97	100	101	102																	
99	103	104																		
99	101	102	104	106																
100	103	103	105	105	105	105														
101	106	107	108																	
102	106	106	106	107	107	107	108													
103	110	110	110 e lode	110 e lode	110 e lode															
104	108	110	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode							
105	110	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode							
106	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode
107	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode								
108	110 e lode	110 e lode	110 e lode	110 e lode	110 e lode															