Studium licencjackie

Kierunek: Metody Ilociowe w Ekonomii i Systemy Informacyjne

Imie i nazwisko autora: Kacper Mordarski

Nr albumu: 101247

<tytu>

Praca licencjacka napisana

w Katedrze Matematyki i Ekonomii Matematycznej

pod kierunkiem naukowym

dr hab. Michaa Ramszy

Warszawa 2022

Contents

1 Introduction

This template is for the BSc papers at Warsaw School of Economics.

2 Basic things

2.1 Compiling LaTeXfiles

The `.tex` file is just a plain text file. It contains the LaTeXformatting codes together with the content of a paper. To get a `.pdf` file you have to compile the `.tex` file using a sequence `pdflatex`, `biblatex`, `pdflatex`, `pdflatex`. This sequence is a default in most editors designed for use with LaTeX.

2.2 Basic formatting for a text

Paragraphs are coded by an empty line. That is is you want to start a new paragraph it is enough to leave an empty line and start typing like that:

```
This is the first paragraph.

This is the next paragraph.
```

Everything about the paragraph is formatted for you including all indents and spacings. Again, you don't have to take care of it manually.

Basic text formatting, e.g. bold face and italic, is achieved with the following commands: `\textbf{}`, `\textit{}`, `\underline{}`, producing **text**, *text*, text. I suggest not overusing those commands!

Alignment is done through environments `center`, `flushleft` and `\flushright` giving the following examples.

This is centered.

This is aligned to the left.

This is aligned to the right.

In other environments it is possible to use `\centering` to center content of that environment (like in `figure` or `table` environments).

2.3 Fonts and fonts' sizes

You do not change fonts and fonts' sizes! Technically it can be done but I will reject this.

3 Mathematics

This is testing footnotes[1].

3.1 Basic mathematics

There are two types of mathematics inside a LaTeX document. The first one is the in-line mathematics and the displayed mathematics. The first one looks like this: $F(x) = \int_{-\infty}^{x} f(\omega)d\omega$ with the code looking like this: `\( F(x) = \int_{-\infty}^{x} f(\omega) d\omega \)`. The displayed mathematics looks like that

$$F(x) = \int_{-\infty}^{x} f(\omega)d\omega$$

with the code

```
\[
F(x) = \int_{-\infty}^{x} f(\omega) d\omega
\]
```

As you can see the same code is formatted differently depending on the type of mathematics.

3.2 Referencing mathematics and other things

To reference mathematics (only displayed formulas) you use the `equation` environment with a `\label{}` within. The reference is done through the `\ref{}` command. The example is

$$F(x) = \int_{-\infty}^{x} f(\omega)d\omega. \tag{1}$$

To reference the equation you use the `\ref{}` command giving (1). The `\label{}` / `\ref{}` pair works for anything that can be referenced.

[1]This is a footnote. We can put some math here $x^2 - f(x) = g(x^2)$ which is not encouraged but sometimes necessary. The other thing we can do is to put here an URL `https://tex.stackexchange.com/questions/249415/set-font-size-for-footnotes`.

3.3 Some more mathematical formulas

Here are slightly more complex formulas. Let A be a matrix

$$A = \left(\begin{bmatrix} 1 & \alpha^2 \\ 2 & \sqrt{\pi} - \log(x - \sin(y)) \end{bmatrix}^2 - \begin{bmatrix} 1 & f(x) \\ 2 & g(y) \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} \right),$$

where

$$f(x) = \begin{cases} \dfrac{1}{x} & \text{for } x < -\dfrac{1}{2}, \\ \dfrac{1}{1+x^2} & \text{for } x \geq -\dfrac{1}{2} \end{cases}$$

and

$$g(y) = \sin\left(\frac{\mathbf{E}(X)}{\cos(y) + \log(y)} \right), \quad \text{where } X \sim \mathrm{N}(0, \sigma).$$

It is very easy to typeset a normal form game. Below is an example of such a game.

	L	M	H
L	$16, 9$	$3, 13$	$0, 3$
M	$21, 1$	$10, 4$	$-1, 0$
H	$9, 0$	$5, -4$	$-5, -15$

4 Figures and tables

Both figures and tables use the same ideas. To insert a table you use the `table` environment. This is an example of a simple table.

Table 1: This is an example of a table.

Name	property 1	property 2	property 3
Michael	23	34	–
John	34	–	28
Mr. Niceguy	123	231	312

Table 1 is a very simple table and much more is possible.

To insert a figure you need to have a figure. In the catalog there are two figures and the following is an example of the `figure` environment.

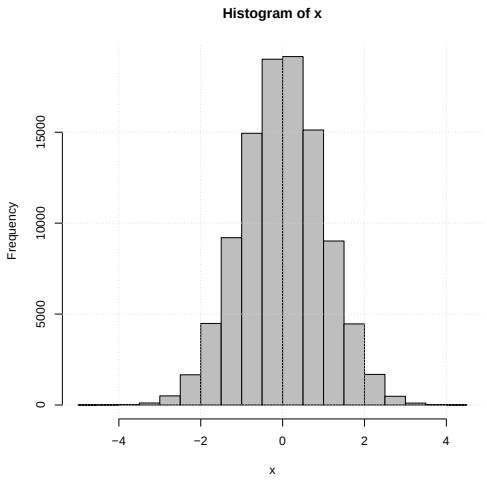
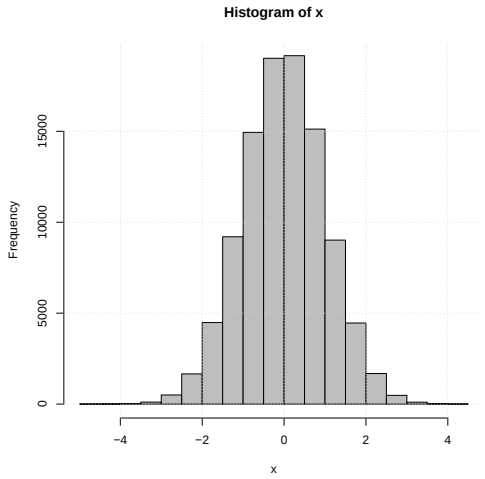
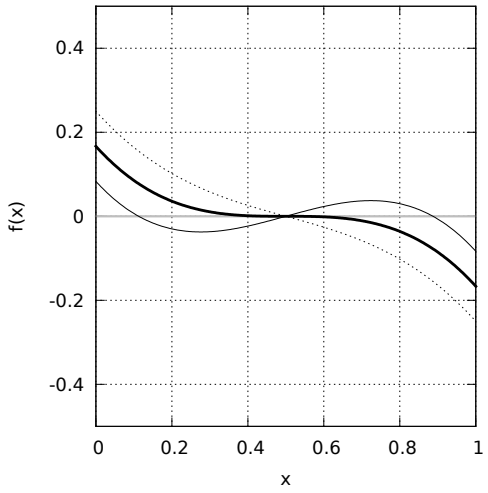


Figure 1: This is just an example. *Source:* own calculations.

Figure 2 is a slightly more complex than just a simple figure but it is useful to have such template. It is possible to refrence subfigures as 2a and 2b.



(a) This is a caption for the first figure. This caption is wrapped at the right width and the hight is being compensated.



(b) This is another caption.

Figure 2: This is the main caption and it is below the figures. *Source:* own calculations

5 Bibliography

The content for the bibliography is in a different file named `refs.bib`. You can change the name but then you have to change the information in this file from `\bibliography{refs}` to `\bibliography{new-name}` where `new-name` is the name of your file. The file `refs.bib` contains some examples for books and papers.

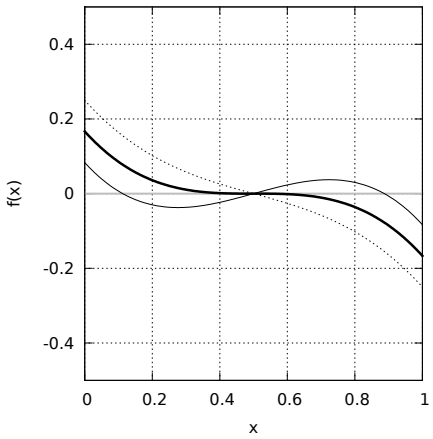


Figure 3: This is how one can wrap a text around a figure. *Source:* own calculations

The process of citation is simple. The command `\cite{garland2010}` gives this Tucker (2010) and puts all information into the bibliography section at the end. Everything is sorted and formatted for you so that you don't have to worry about this. An example of a paper with many authors is Benaim and Weibull (2003) or Osborne and Rubinstein (1998).

Table 2: Binary variables used in the VAR model

t	year	elections	crises	tax cuts
1	1961	0	0	0
2	1962	0	0	0
3	1963	0	0	0
4	1964	1	0	0
5	1965	0	0	1
6	1966	0	0	0
7	1967	0	0	0
8	1968	1	0	0
9	1969	0	0	0
10	1970	0	0	0
11	1971	0	0	0

Continued on next page

Table 2 – *Continued from previous page*

t	year	elections	crises	tax cuts
12	1972	1	0	0
13	1973	0	0	0
14	1974	0	1	0
15	1975	0	1	0
16	1976	1	0	0
17	1977	0	0	0
18	1978	0	0	0
19	1979	0	0	0
20	1980	1	0	0
21	1981	0	0	0
22	1982	0	1	1
23	1983	0	0	0
24	1984	1	0	0
25	1985	0	0	0
26	1986	0	0	1
27	1987	0	0	0
28	1988	1	0	0
29	1989	0	0	0
30	1990	0	0	0
31	1991	0	1	0
32	1992	1	0	0
33	1993	0	0	0
34	1994	0	0	0
35	1995	0	0	0
36	1996	1	0	0
37	1997	0	0	0
38	1998	0	0	0
39	1999	0	0	0

Continued on next page

Table 2 – *Continued from previous page*

t	year	elections	crises	tax cuts
40	2000	1	0	0
41	2001	0	1	1
42	2002	0	0	1
43	2003	0	0	1
44	2004	1	0	0
45	2005	0	0	0
46	2006	0	0	0
47	2007	0	0	0
48	2008	1	1	0
49	2009	0	1	1
50	2010	0	0	1
51	2011	0	0	0
52	2012	1	0	0
53	2013	0	0	0
54	2014	0	0	0
55	2015	0	0	0

A Appendix: Some important stuff

This appendix contains all the necessary important stuff, blah, blah, blah ...

Table 3: Tutaj jest tytu tablicy

Nazwa atrybutu	Wartoci	Opis
chk_acct	-	stan rodków na rachunku biecym (jakociowa)
	A11	... <0 Marek Niemieckich
	A12	0 <... <200 Marek Niemieckich
	A13	... >200 Marek Niemieckich
	A14	brak rachunku biecego
duration	-	czas trwania kredytu w miesicach (numeryczna)
history	-	przeszo kredytowa (jakociowa)
	A30	brak kredytów w historii/wszystkie kredyty poprawnie spacone
	A31	wszystkie kredyty poprawnie spacone (zacignite w tym banku)
	A32	kredyty poprawnie spacane po dzie dzisiejszy
	A33	opónienia w poprzednich spatach kredytu
	A34	konto krytyczne/zacignite kredyty w innych bankach
purpose	-	cel (jakociowa)
	A40	nowy samochód
	A41	uywany samochód
	A42	meble
	A43	telewizor
	A44	urzdzenia gospodarstwa domowego
	A45	remont
	A46	edukacja
	A47	wakacje
	A48	przekwalifikowanie
	A49	biznes
	A410	inne

kontynuowane na nastpnej stronie

Table 3 – *kontynuacja z poprzedniej strony*

Nazwa atrybutu	Wartoci	Opis
amount	-	kwota kredytu (numeryczna)
say_acct	-	saldo na rachunku oszczdnociowym/warto posiadanych obligacji (jakociowa)
	A61	... <100 Marek Niemieckich
	A62	100 <= ... <500 Marek Niemieckich
	A63	500 <= ... <1000 Marek Niemieckich
	A64	... >= 1000 Marek Niemieckich
	A65	nieznane/ brak oszczdnoci
employment	-	czas zatrudnienia w obecnej pracy (jakociowa)
	A71	brak zatrudnienia
	A72	... <1 rok
	A73	1 <= ... <4 lata
	A74	4 <= ... <7 lat
	A75	... >= 7 lat
install_rate	-	wielko raty jako procent rozporzdzalnego przychodu (liczbowa)
pstatus	-	pe i stan cywilny (jakociowa)
	A91	mczyzna; rozwodnik/w separacji
	A92	kobieta; rozwiedziona/ w separacji/ matka
	A93	mczyzna ; wolny
	A94	mczyzna ; onaty/ wdowiec
	A95	kobieta ; wolna
other_debtor	-	inni dunicy/ porczyciele (jakociowa)
	A101	brak
	A102	wspókredytobiorca
	A103	porczyciel
property	-	wasno/ mienie (jakociowa)

kontynuowane na nastpnej stronie

Table 3 – *kontynuacja z poprzedniej strony*

Nazwa atrybutu	Wartoci	Opis
	A121	nieruchomo
	A122	(jeli nie A121) umowa oszczdnociowa/ ubezpieczenie na ycie
	A123	(jeli nie A121/A122) samochód lub inne
	A124	nieznane
timer_resid	-	czas zamieszkania w aktualnym miejscu zamieszkania (liczbowa)
age	-	wiek w latach (liczbowa)
other_install	-	inne zobowizania ratalne (jakociowa)
	A141	bank
	A142	sklepy
	A143	brak
housing	-	warunki mieszkaniowe (jakociowa)
	A151	wynajem
	A152	wasno
	A153	zamieszkanie bez ponoszenia kosztów
other_credits	-	liczba aktualnych kredytów w tym banku (liczbowa)
job	-	praca (jakociowa)
	A171	bezrobotny/niewykwalifikowany; cudzoziemiec
	A172	niewykwalifikowany; rezydent
	A173	wykwalifikowany pracownik/urzdnik
	A174	menader/ samozatrudniony/ wysocewykwalifikowany/ wyszy urzdnik
num_depend	-	liczba osób na utrzymaniu (liczbowa)
telephone	-	telefon (jakociowa)
	A191	brak
	A192	tak, zarejestrowany pod nazwiskiem klienta
foreign	-	pracownik zagraniczny (jakociowa)

kontynuowane na nastpnej stronie

Table 3 – *kontynuacja z poprzedniej strony*

Nazwa atrybutu	Wartoci	Opis
	A201	tak
	A202	nie
response	-	decyzja kredytowa
	1	tak
	2	nie

References

Benaim, M. and Weibull, J. W. (2003), 'Deterministic approximation of stochastic evolution in games', *Econometrica* **71**, 873–903.

Osborne, M. and Rubinstein, A. (1998), 'Games with procedurally rational players', *American Economic Review* **88**, 834–847.

Tucker, G. S. (2010), *The High Tide of American Conservatism: Davis, Coolidge, and the 1924 Election*, Emerald Book.

List of Tables

List of Figures

Streszczenie

Tutaj zamieszczaj Pastwo streszczenie pracy. Streszczenie powinno by dugoci okoo pó strony.