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Bachelor Thesis
or
Term paper for the
Seminar Title
?? Term 20??

Department of Economics
University of Mannheim

submitted to:
Prof. Dr. Johannes Pfeifer

submitted by:
Your name
Student ID: ????
Degree Program: Bachelor of Science in Economics

Street name and number
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Contents

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List of Abbreviations

DSGE Dynamic Stochastic General Equilibrium.

OLS Ordinary Least Squares.

List of Symbols

e	Euler number.
i	square root of -1.
π	ratio of circumference of circle to its diameter.

1. Required Software

For Windows:

- Miktex (http://miktex.org/). Do a full install and select that packages are automatically installed on the fly. This will ensure that all required packages are there.
- A text editor like the free TeXWorks, delivered with your MikTex installation, the free TeXnicCenter (www.texniccenter.org/) or the commercial WinEdt (http://www.winedt.com/)
- Bibtex-GUI: JabRef (http://jabref.sourceforge.net/)
- If you are willing to invest, MathType (http://www.dessci.com/en/products/mathtype/default.htm) is a commercial formula editor similar to the one in MS-Word that allows you to typeset your equations using a GUI and then export your formulas as LaTeX-code. There is a free 30-day Trial version. In Preferences-> Cut and Copy Preferences, set the Translator to AMSLatex and simply copy your equations into the text editor.
- This file uses BibLaTeX with `biber` as its backend. You need to select a corresponding output mode in your TeX-Editor. See http://tex.stackexchange.com/questions/154751/biblatex-with-biber-configuring-my-editor-to-avoid-undefined-citations for detailed instructions. Alternatively, you can just change the `backend=biber` in the preamble to `backend=bibtex` to rely on BibTeX. While this usually works immediately without requiring the user to change anything, `backend=bibtex` offers less flexibility.
- The typical output mode when using LaTeXis PDF. Thus, you will need a PDF Viewer. While Adobe Reader works, many people prefer using Sumatra (http://blog.kowalczyk.info/software/sumatrapdf/), which is an easy and quick alternative.

2. Section Heading

2.1. Subsection Heading

Subsection Heading that has no number and does not appear in the Table of Contents

In *math environments* like the inline math environment started with a $ sign[1] you can use the shortcut defined in the preamble to make a regular β bold: $\boldsymbol{\beta}$. Important equations you will use later on should be numbered, e.g.

$$b = (x'x)x'y \ . \tag{1}$$

Note also the use of a \ after e.g. to make the whitespace after the fullstop consistent with its use as an abbreviation sign instead of signalling the end of a sentence. Also do not forget the punctuation marks after equations. Here `\;.` generates a bit of white space using the `\;` and then sets a fullstop.

Other auxiliary equations should be unnumbered, e.g.

$$a = 1 \ .$$

You can now refer to the first equation as equation (1) using the defined label. With the same syntax you can refer to Figure 1 or Figure 2. Using `eqref` puts the number in brackets. The tilde between "Figure" and "`\ref{fig:Ideas2}`" prevents that the number is shifted to a different line if there is a line feed. Similarly, you can refer to Table 3. Note the use of ``` `` ``` and `''` to generate correct quotation marks.

The command `\tag{equationname}` allows giving explicit names to equations

$$b = (x'x)x'y \tag{OLS Estimator}$$

or in combination with `\ref{}` to repeat equation numbers

$$b = (x'x)x'y \ . \tag{1}$$

You can also align equations using the `align`-environment and the & as the

[1] Because the $ signals the beginning of a math-environment, you must use `\$` to print a dollar sign. Similarly, because the % sign indicates a comment in LaTeX, you must use `\%` to print a percent sign.

tab-character.

$$u'(c_t) = \beta u'(c_{t+1}) \left[\alpha A k_{t+1}^{\alpha-1} + (1-\delta)\right] \tag{2}$$

$$c_t = A k_t^{\alpha} - k_{t+1} + (1-\delta)k_t \; . \tag{3}$$

Do **never** use the `eqnarray`-environment! Note the use of `\left[` and `\right]` to generate brackets that fit the height of the enclosed text. Finally, you can split a single equation across more than one line:

$$\begin{aligned} c^* + c^*\hat{c}_t = {} & A\left(k^*\right)^{\alpha} + \alpha A \left(k^*\right)^{\alpha-1} k^* \hat{k}_t \\ & - \left(k^* + k^*\hat{k}_{t+1}\right) + (1-\delta)k^* + (1-\delta)k^*\hat{k}_t \end{aligned} \tag{4}$$

For more information on mathematics, see the AMS documentation at http://www.tug.org/texlive/Contents/live/texmf-dist/doc/latex/amsmath/amsldoc.pdf.

3. Using Labels in LaTeX

You have already seen that it is possible to define labels in LaTeX in order to reference to the objects you labelled. Examples are the referencing of equations, figures or tables. It is good LaTeX-style to provide meaningful descriptions that ideally distinguish the type of object you are referring to. Usually, people prefix `eq:` to the label when they refer to equations or `fig:` or `tab:` for figures and tables. Hence, for example use `\label{eq:ols}` instead of just `\label{equation1}`.

4. Figure and Tables

Important figures and tables should be put in the main text. Sometimes this produces problems with the floats, i.e. figures and tables are placed in the document where they should not appear.[2] You can try to control the placement of the figure and table floats by specifying the preferred positioning as was done directly after the table environment of Figure 1 or Table B.1. Also, after sections you can put a `\clearpage` to start the next section at a new page and place the float objects. All supplementary tables and figures should be put in an appendix.

[2] For more information what floats are and how they affect your layout see http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions.

Table 3: Title of the table

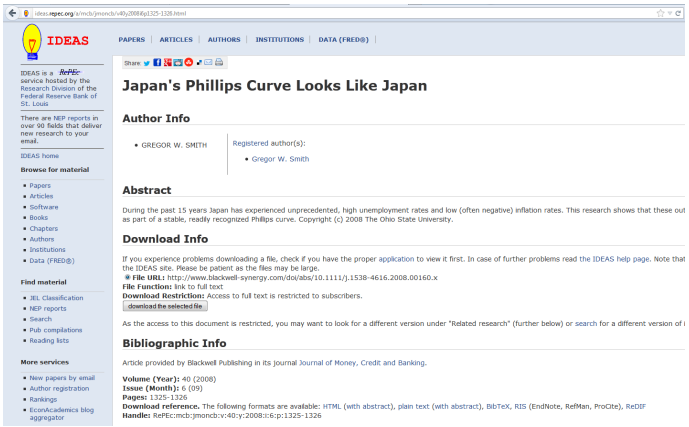
A	small	table
left aligned	centered two lines separated by a line	right aligned
	Text over two columns	third column

Notes: Add the description here

All tables and figures should have a sufficient description to be readable without referring back to the main text. Use the `\caption` and `\caption*` commands. Be reminded that `\label` should always be put after the `caption` command, never before. Otherwise LaTeX may not find the reference.

When dealing with larger tables, LaTeXquickly becomes impractical. However, there are good converters like Excel2Latex (http://www.ctan.org/tex-archive/support/excel2latex/) that make life a lot easier. When designing tables, go professional and do not use vertical lines. Rather, use the `booktabs` (see http://www.ctan.org/tex-archive/macros/latex/contrib/booktabs/) package (and the booktabs option in Excel2Latex). For more information on tables in general and professional tables in particular, see http://en.wikibooks.org/wiki/LaTeX/Tables.

The following code creates two columns and is useful in presentations, where due to landscape mode sometimes text shall be displayed to the left or right of a figure. Avoid using it in portrait-format documents. Note that the caption has been omitted so that the figure does not appear in the List of Figures.



1. This is some text...
2. This more text

5. References and Citations

References should be managed using BibLaTeX. A good GUI-interface for Windows is JabRef. Download it at http://jabref.sourceforge.net/. As shown in Figures 1 and 2, you can download the bibliographic information for many economic references from ideas.repec.org or databases like JSTOR or ScienceDirect. Just copy the Bibtex-key and paste it into Jabref as shown in Figure 3. Try assigning unique and expressive BibTeX-keys, i.e. use for example *Smith2006* instead of *Reference1* (or even better *Smith2006Japan*).

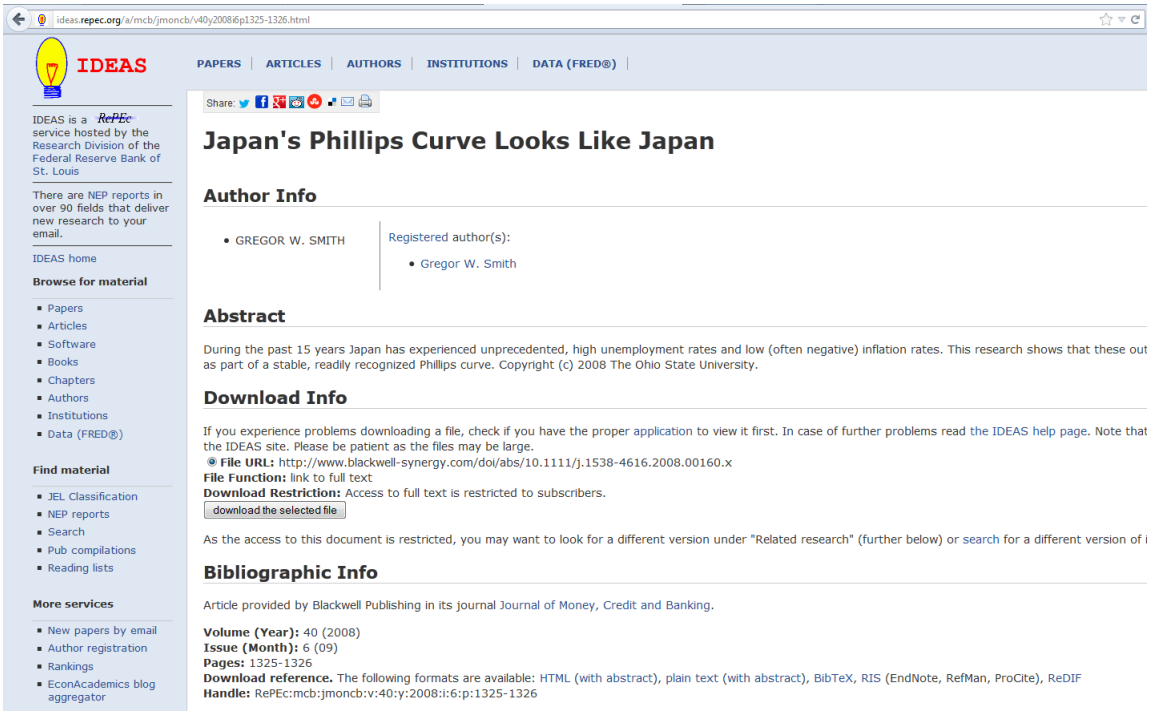


Figure 1: To download the bibliographic information from Repec, klick on *Download reference: Bibtex*

Please use inline citations and not citations in footnotes.[3,4] The command `\textcite{Smith2006}`, where *Smith2006* is the Bibtex-Key defined in JabRef, cites the reference with the name: Smith (2008). The command `\parencite{Smith2006}` cites the reference in

[3] As you can see, footnotes are placed with the `\footnote`-command. Sometimes footnotes can become quite long. In this case, LaTeX automatically distributes the footnote over more than one page. Sometimes this automatic setting does not perform the way it should. You can change the behavior by setting `\interfootnotelinepenalty=x`, where x is an integer from 0 to 10,000, with 100 being the default. When set to 10,000 LaTeX will not split the footnote. The option `\interfootnotelinepenalty=x` can be both set in the preamble to affect all footnotes or in the text immediately before a footnote. In the latter case, it needs to be set back to its default if you want the command to only affect one footnote.

[4] For further BibLaTeX-commands that allow for many more options, see http://mirror.ctan.org/macros/latex/contrib/biblatex/doc/biblatex.pdf.

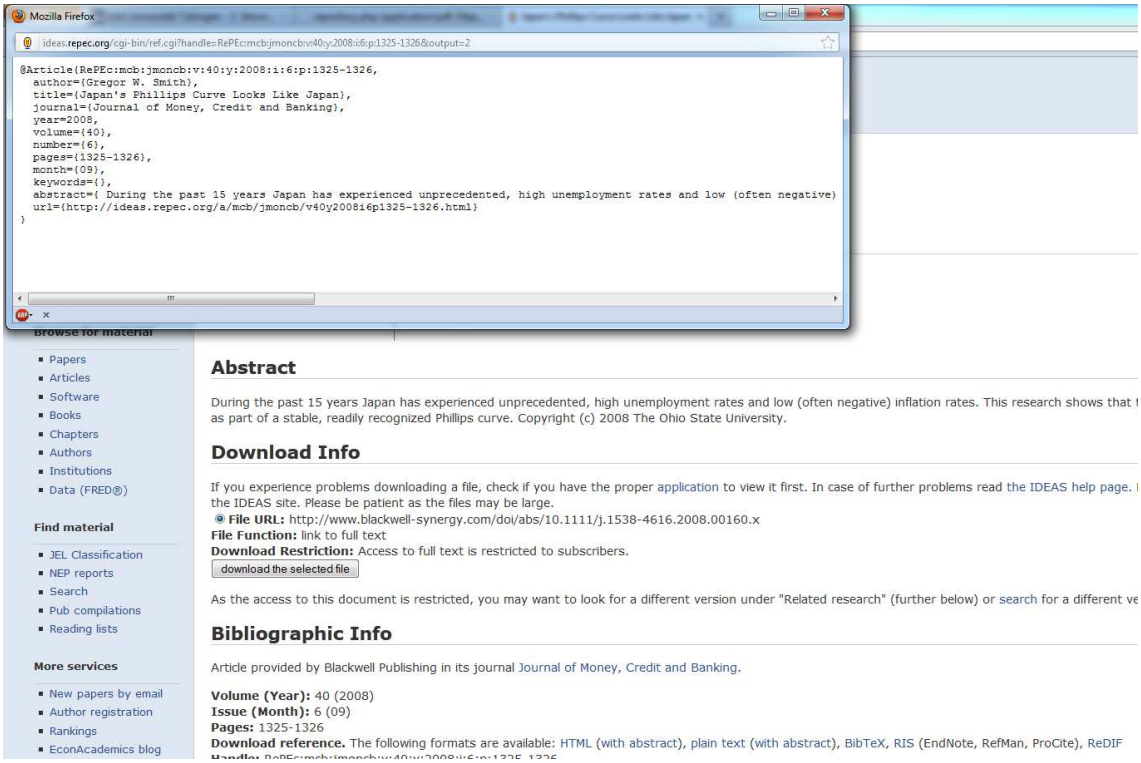


Figure 2: Copy the text from the window into the memory

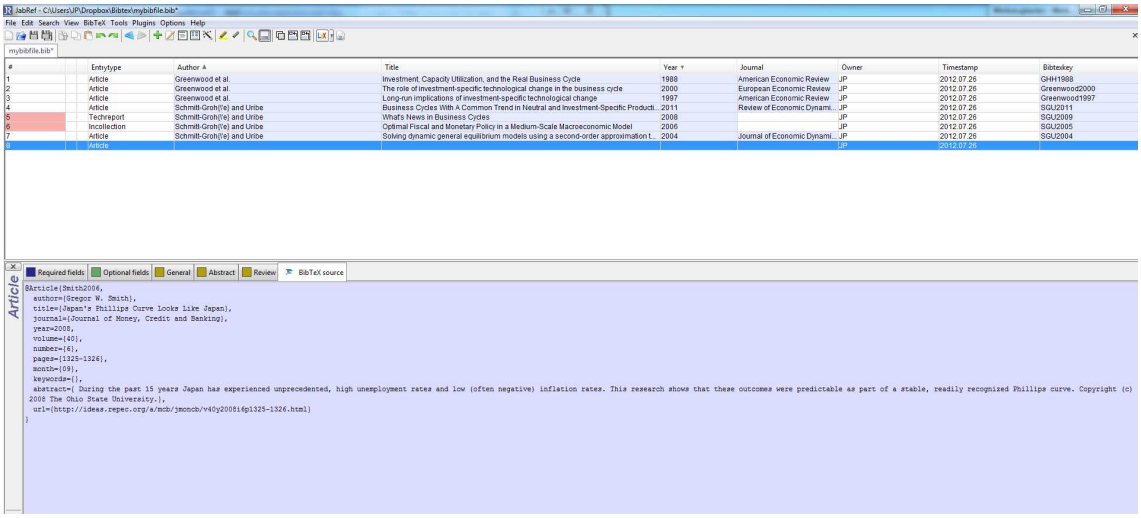


Figure 3: Klick on the Add-Button (green plus) and paste the copied text to *Bibtex Source*. Do not forget to change the Bibtex-key (the first entry). Here I chose the key `Smith2006`

parentheses: (Smith 2008). The command `\parencite[Prefix][Suffix]\{Smith2006\}` allows for Prefixes and Suffixes in the parentheses: (see e.g. Smith 2008, pp. 1-4).

BibLaTeXautomatically shortens multiple citations with the same authors, e.g. (Schmitt-Grohé and Uribe 2004a,b, 2008, 2011) and provides correct referencing with a,b, etc. Moreover, it takes care of different bibliography requirements of articles like Schmitt-Grohé and Uribe (2004b) and books like e.g. Schmitt-Grohé and Uribe (2006).
The style of the bibliography is controlled using the `bibstyle`-option. The current document uses the JME-style file.

For electronic sources like blog-posts (e.g. Krugman 2012), you should use the `electronic`-entrytype in JabRef. Unfortunately, you must manually add the `urldate`-field to the BibTeX-source as shown in Figure 4 in order to print out the access date. The correct field format is YYYY-MM-DD.

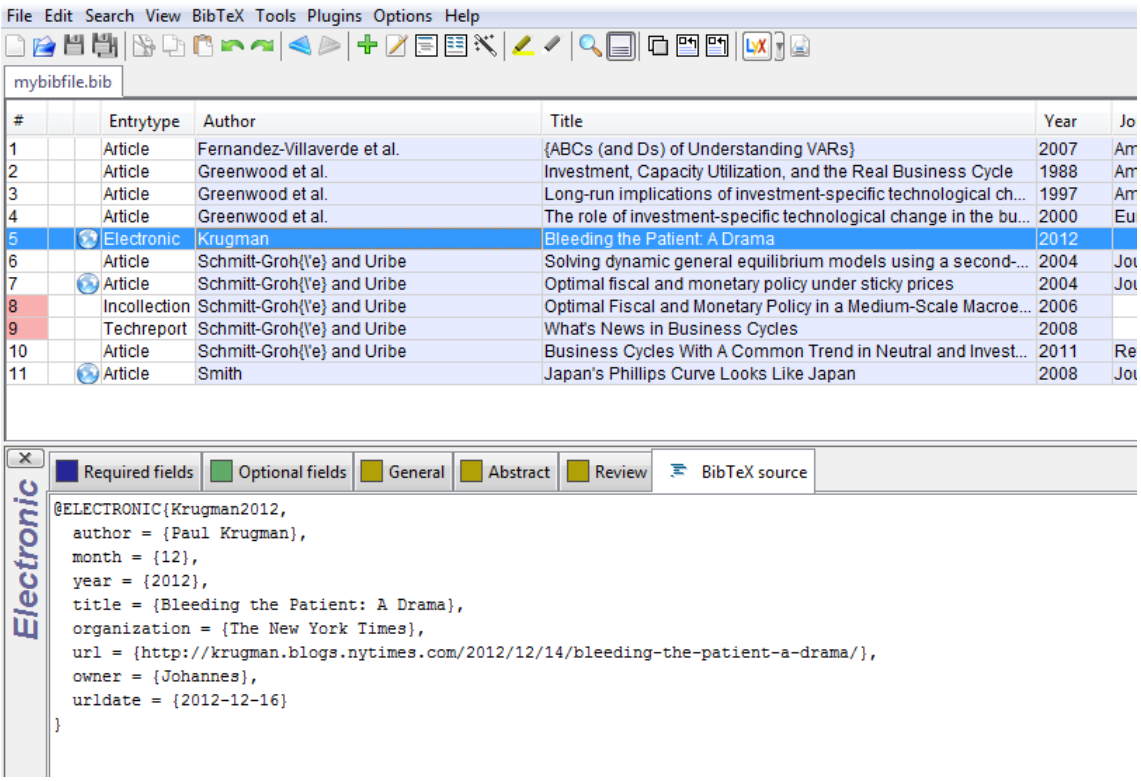


Figure 4: For electronic sources, you must manually enter the `urldate`-field in the BibTeXsource.

6. List of Symbols and Abbreviations

A List of Symbols and a List of Abbreviations as displayed at the beginning of this document can be created using the `glossaries` package.[5] In case you are using TeXnicCenter, you may have to manually add makeindex to the profile.[6]

6.1. The `glossaries` package in the preamble

The `glossaries` package is one of the few packages that must be loaded after the `hyperref`-package. In the current document, I use the standard glossary to list acronyms. In addition to the default glossary, I have defined a second glossary for the List of Symbols, labeled `symbolslist`, using the command
`\newglossary[slg]{symbolslist}{syi}{syg}{List of Symbols}`.

After defining the glossaries, you must put `\makeglossaries` to allow for sorting of the glossary entries.

To print the List of Abbreviations, put
`\printglossary[type=\acronymtype,style=long]`.[7]
To print the List of Symbols, put
`\printglossary[type=symbolslist,style=long,title=List of Symbols]`.

6.2. Defining the list entries and referencing them

The entries for the glossaries can either be defined in the preamble or in the main text. For example, the command `\newglossaryentry{symb:pi}{name={\ensuremath{\pi}}...`, used in the preamble of this document, defines an entry for the glossary `symbolslist`. However, the symbol π will not appear in the List of Symbols unless you tell LaTeX that you have used it. Usually, you do this by referencing it using the `\gls{}`-command. For example, `\gls{symb:pi}` prints π. This command can also be used inside of equations like this one

$$e^{i\pi} - 1 = 0 \tag{5}$$

[5] For more information, see the beginner's guide at http://mirror.ctan.org/macros/latex/contrib/glossaries/glossariesbegin.pdf and the documentation at http://mirror.ctan.org/macros/latex/contrib/glossaries/glossaries.pdf.

[6] See http://brianhoffmann.de/journal/thesis/2011-08-01/latex-glossaries-with-texniccenter/ or https://tex.stackexchange.com/questions/153323/acronyms-glossaries-not-being-output-in-the-pdf/.

[7] Of course, the style can be changed.

You can also define symbols or acronyms in the main matter, for example putting `\newacronym{acro:DSGE}{DSGE}{Dynamic Stochastic General Equilibrium}` at the beginning or end of a paragraph where you use the symbol/acronym the first time. Subsequently in the text, you can refer to the acronym using the command `\gls{}`, e.g. `\gls{acro:DSGE}`. The first time you use it, LaTeX automatically prints the long version followed by the abbreviation. The second time, only the acronym is printed. For example, Dynamic Stochastic General Equilibrium (DSGE) will from now on be abbreviated as DSGE. Moreover, all symbols/abbreviations referenced with `\gls{}` (or its derived commands) are automatically added to the list of symbols/abbreviations.
For glossaries to be updated correctly, you usually have to run LaTeX (at least) twice.

If you are not going for the full capabilities of glossaries, you can also just define the symbol or acronym you are using in the preamble and add it to the respective list by putting `\glsadd{}` after the definition as I did with the `\glsadd{OLS}`. In this case, the symbol/acronym will appear in the List of Symbols/Abbrevations even if you did not reference it with `\gls{}`. Hence, this is an quick and dirty way to create such a list. However, this procedure is not advised as you now have to make sure manually that only abbreviations/symbols used at least once in the text appear in the list.

7. Further Information

- Almost every imaginable LaTeX-question has been asked before. Just google or search the FAQ at http://www.tex.ac.uk/cgi-bin/texfaq2html?introduction=yes
- There are deadly LaTeX sins you should never commit, see http://queen.elektro.uni-miskolc.hu/~gati/references/latex/latex/l2tabuen.pdf.
- Helpful resources can be found at http://en.wikibooks.org/wiki/LaTeX/.
- For presentations use LaTeX Beamer, see ftp://ftp.fu-berlin.de/tex/CTAN/macros/latex/contrib/beamer/doc/beameruserguide.pdf.

References

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A. Appendix 1

Some Information relegated to the appendix.

$$MV = PQ \tag{A.1}$$

B. Supplementary Tables

Table B.1: Title of the table

Another	small	table
left aligned	centered	right aligned
Text over two columns		third column

Notes: Add the description here

C. Eidesstattliche Versicherung/Affidavit

Ich versichere, dass ich die vorliegende Arbeit ohne Hilfe Dritter und ohne Benutzung anderer als der angegebenen Quellen und Hilfsmittel angefertigt und die den benutzten Quellen wörtlich oder inhaltlich entnommenen Stellen als solche kenntlich gemacht habe. Diese Arbeit hat in gleicher oder ähnlicher Form noch keiner Prüfungsbehörde vorgelegen.
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