Short title

Subtitle

Authors name
Faculty of Name of Faculty,
Department of Department name,
Uppsala

Doctoral Thesis
Swedish University of Agricultural Sciences
Uppsala 2020

Acta Universitatis agriculturae Sueciae
20xx:xx

Cover: what a stunning picture
Illustration/Phote: From

ISSN 1652-6880
ISBN (print version) 978-XX-XXX-XXXX-X
ISBN (electronic version) 978-XX-XXX-XXXX-X
© 2020 Authors name, Uppsala
Print: SLU Service/Repro, Uppsala 2020

Title of the thesis

Abstract

Here is an abstract

Keywords: Key words, thesis, template

Author's address: Authors name, SLU, Department of Crop Production Ecology
P.O. Box XXX, 750 07 Uppsala, Sweden
E-mail: firstname.lastname@slu.se

Swedish title of the thesis

Sammanfattning

Here is space for the svenska sammanfattning

Dedication

To everyone

Contents

List of Publications **9**

1 Introduction **11**

2 Aim and hypotheses **12**

3 Material and Methods **13**

4 The first section **13**
4.1 A subsection 13
4.2 Another subsection 13

5 Figures and Tables **13**

6 The basic model **15**
6.1 Research and intermediate good production 15

7 Conclusions **16**
7.1 An apparently gratuitous subsection 16
7.1.1 Just to allow this subsubsection for illustration 16

List of Publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I Authors (Year). Title. *Journal* vol(issue), X–Y.

II Rob Hart (2002). Dynamic pollution control—time lags and optimal restoration of marine ecosystems. *Ecological Economics* 47(1), 79–93.

III Stefanie Hoeber(2019). Decomposition in *Salix* fields- Difference between mixtures? (manuscript)

IV Rob Hart (2002). Growth, environment, and culture—encompassing competing ideologies in one 'new growth' model. *Ecological Economics*, forthcoming.

Papers I is reproduced with the permission of the publishers.

The contribution of Stefanie Hoeber to the papers included in this thesis was as follows:

I

II

III

IV

1 Introduction

Welcome to my thesis.

2 Aim and hypotheses

3 Material and Methods

4 The first section

4.1 A subsection

Clever, eh?

4.2 Another subsection

Now I'm going to cite something—Aghion and Howitt's book [Aghion and Howitt, 1998]. Now I'm going to cite it as a noun. Aghion and Howitt [1998] is a fantastic book. Now I'm going to refer to subsection 4.1. It is very short.

5 Figures and Tables

Figure 1 is included to show the formatting of figures, and to illustrate the power of the 'psfrag' package in LaTeX.

Figure 1: The steady state: (a) Growth–arbitrage; (b) resource supply/demand.

Figure 2 is included to show how to include figures in png formate.

Table 1 is just there to demonstrate the formatting of tables in the Thesis style.

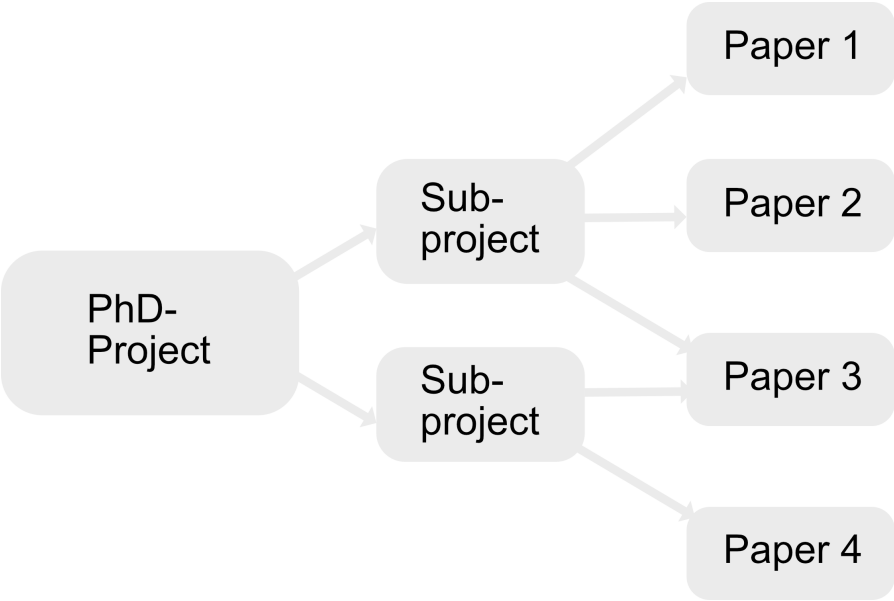

Figure 2: Schematic diagram of the PhD-project including all sub-projects papers.

| xx | yy | zz | a | b | c |

| xx | yy | zz | a | b | c |

| xx | yy | zz | a | b | c |

Table 1: Just for fun

6 The basic model

6.1 Research and intermediate good production

There are H infinitely-lived skilled workers who choose between production of intermediate goods and research on new intermediate goods. Individuals aim to maximize the present value of their consumption.

Researchers produce discoveries at a rate $\lambda^r H^r$, the Poisson arrival rate multiplied by the number of researchers. If τ indicates the time a discovery is made, and t indicates the present time, then $Y_{t,\tau}$ indicates the production of final goods from intermediate inputs of vintage τ, age $t-\tau$. This production is given by

$$Y_{t,\tau} = \lambda^r H^r A_\tau (x_{t-\tau})^\alpha \tag{1}$$

where A_τ denotes the intrinsic productivity of the intermediate good, and $x_{t-\tau}$ is the number of production workers employed on goods of age $t-\tau$. Total production in the economy is then given by

$$Y_t = \int_{-\infty}^{t} \lambda^r H^r A_\tau (x_{t-\tau})^\alpha d\tau. \tag{2}$$

The value of making a discovery at time τ is given by V_τ equal to the discounted present value of profits from subsequent production,

$$V_\tau = \int_{\tau}^{\infty} e^{-r(s-\tau)} \pi_{s,\tau} ds. \tag{3}$$

Profits at time s to the producer of good τ, $\pi_{s,\tau}$, are given by

$$\pi_{s,\tau} = (p_{s,\tau} - w_s)x_{s,\tau}. \tag{4}$$

(Workers are free to work in production of any intermediate good, so wages must be equal in each intermediate sector). But the marginal product of intermediate good $x_{s,\tau}$ is $\alpha A_\tau x_{s,\tau}^{\alpha-1}$. Using this fact, and the first order condition for profit maximization, we obtain

$$x_{s,\tau} = \left(\frac{\alpha^2 A_\tau}{w_s}\right)^{1/(1-\alpha)} \tag{5}$$

$$\pi_{s,\tau} = \alpha^{\frac{1+\alpha}{1-\alpha}}(1-\alpha)w_s^{\frac{-\alpha}{1-\alpha}}A_\tau^{\frac{1}{1-\alpha}}. \tag{6}$$

If we assume steady state growth at rate g then we have that $w_s = w_\tau e^{g(s-\tau)}$. Substituting this in to equations 5 and 6 we obtain

$$x_{s,\tau} = \left(\frac{\alpha^2 A_\tau}{w_\tau}\right)^{1/(1-\alpha)} e^{-g(\frac{s-\tau}{1-\alpha})} \tag{7}$$

$$\pi_{s,\tau} = \alpha^{\frac{1+\alpha}{1-\alpha}}(1-\alpha)[w_\tau e^{g(s-\tau)}]^{\frac{-\alpha}{1-\alpha}}A_\tau^{\frac{1}{1-\alpha}}. \tag{8}$$

Putting this into equation 3 yields the solution

$$V_\tau = \alpha^{\frac{1+\alpha}{1-\alpha}}(1-\alpha)w_\tau\left(\frac{A_\tau}{w_\tau}\right)^{\frac{1}{1-\alpha}}(r + g\frac{\alpha}{1-\alpha})^{-1}. \tag{9}$$

7 Conclusions

7.1 An apparently gratuitous subsection

7.1.1 Just to allow this subsubsection for illustration

Goodbye.

References

P. Aghion and P. Howitt. *Endogenous Growth Theory*. MIT, 1998.

Acknowledgements

Thanks everyone.