Karlsruhe Institute of Technology

Institute for Economics (ECON)
Chair in Economic Policy
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Karlsruhe, June 26th 2014

Seminar in Economic Policy – Winter 2014/15

ICT, Big Data, and Industry 4.0

1 Introduction

Economic theory as a foundation for policy recommendations

The field of Economic Policy focuses on establishing a general framework for governmental economic activity. Furthermore, it investigates the consequences of government interventions into the market that aim at correcting the market outcome. Embedded in this context the team at the Chair in Economic Policy analyzes government activity. The three core areas are Innovation, Economic Growth and Regional Development. In their research the team develops formal theoretical models and applies these models by means of simulations and empirical analyses to concrete economic problems. The objective is to derive policy recommendations that are based in theory.

2 Topics

In the seminar, three respective economic issues will be analyzed in three main areas. The following topics are being considered:

Information and Communication Technologies

1. ICT in Germany: Spatial growth and innovation patterns
   Literature: Maurseth and Frank (2009)
2. ICT and growth accounting
   Literature: Oulton (2012)
3. ICT-assisted economies: Production, unemployment and wage flexibility
   Literature: Pannone (2010)

Big Data

4. Big data: implications for economic policy and economic research
   Literature: Einav and Levin (2013)

5. Measuring the digital economy - traditional and recent approaches
   Literature: Nathan and Rosso (2014)

6. Big data and industrial knowledge spillovers
   Literature: Autio et al. (2004)

Industry 4.0

7. Vertical integration: theoretical perspectives
   Literature: Acemoglu et al. (2004, 2005)

8. Internet of things: economic implications of new structures in production processes
   Literature: Atzori et al. (2010), Roland Berger Strategy Consultants (2014), Heng (2014)

9. Industrial robotics: analyses based on patent and publication data
   Literature: tba

The literature sources indicated only serve as a starting point for elaborations. Supplementary literature search is essential for a complete and differentiated examination of the particular seminar topic.

If you encounter difficulties during processing or in any way have need for coordination, you can contact us. Questions regarding *ICT* should be directed to Mr. Florian Kreuchauff, those concerned with *Big Data* to Prof. Ingrid Ott, and issues about *Industry 4.0* to Mr. Vladimir Korzinov.

3 Organisation

The seminar is intended for Master and Diploma students at KIT.

3.1 Application

The registration has to be submitted online at the service portal of the Department of Economics and Management (`https://studium.wiwi.kit.edu/`). Between Thursday, June 26th 2014, and Sunday, July 6th 2014, the online application forms are activated.

The number of seminar participants is limited to 18. If there are more applications than that, previous course participations at the Chair in Economic Policy are taken into consideration for acceptance decisions.

Applicants will be notified about these decisions via email on July 7th 2014. Participation must then be confirmed until July 11th 2014.

3.2 Time schedule

There will be two blocked phases of attendance on which presence is mandatory:

1. Introduction and preliminary discussion on Thursday, July 17th 2014, 2:00 - 3:30 p.m., in room 002, building 20.12.
2. Presentations on Thursday, November 6th 2014, in room 002, building 20.12, and on Friday, November 7th 2014, room 214, building 20.14, hours to be announced.

Time schedule is of preliminary nature. Any changes will be announced promptly.

3.3 Certificates

In order to be regularily registered, participants will have to provide a completed seminar form until Thursday, July 17th 2014. The mailbox of the Chair in Economic Policy is located in building 20.14, ground floor.

The corresponding form template for Master students is to be found in the download section of the Department of Economics and Management (Section: Study and Education: `https://www.wiwi.kit.edu/english/studium.php`).

Placeholder in the module handbooks is SemIWW3. Students in the Diploma program receive a form from the secretariat at the Chair in Economic Policy.

3.4 Formalities

The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO). The final grade is composed of the weighted graded examinations. (Essay 50%, 40% oral presentation, active participation 10%).

The final version of the written paper has to be provided until Wednesday, October, 29th 2014, printed three times. Again, please use the mailbox of the Chair in Economic Policy, which is located in building 20.14, ground floor. Additionaly, please provide a a PDF-version of your work (via email, CD, or USB flash drive).

The title page must list the respective student's name, identification number, study programme, and the current number of semesters. Moreover, the final paper has to include a signed statement according to the following text:

> *Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, keine anderen als die angegebenen Quellen und Hilfsmittel benutzt zu haben, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht zu haben und die Satzung des Karlsruher Instituts für Technologie (KIT) zur Sicherung guter wissenschaftlicher Praxis beachtet zu haben.*

We expressly point out that **all papers in which signed statements are missing, will not be accepted** and students will therefore not be graded. Also take into consideration the brief notes on writing an academic paper from the Chair in Economic Policy (`http://wipo.econ.kit.edu/english/68.php`). In particular, list all your references in an appended bibliography at the end of the paper. There is a password protected LaTeX template for papers available. In case you are interested in adopting the template for your paper we recommend that you use it in combination with MikTeX and WinEdt.

All further details of preparation are discussed during the first meeting (Introduction and preliminary discussion).

Literaturverzeichnis

Acemoglu, D., Aghion, P., Griffith, R. and Zilibotti, F.: 2004, Vertical Integration and Technology: Theory and Evidence. NBER Working Paper Series 10997.

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Atzori, L., Iera, A. and Morabito, G.: 2010, The Internet of Things: A Survey, *Computer Networks* **54**, 2787–2805.

Autio, E., Hameri, A.-P. and Vuola, O.: 2004, A framework of Industrial Knowledge Spillovers in Big-Science Centers, *Research Policy* **33**, 107–126.

Einav, L. and Levin, J. D.: 2013, The Data Revolution and Economic Analysis. NBER Working Paper Series 19035.

Heng, S.: 2014, Industry 4.0: Upgrading of Germany's Industrial Capabilities on the Horizon, *Deutsche Bank Research Report*, Deutsche Bank.

Maurseth, P. B. and Frank, B.: 2009, The German Information and Communication Technology (ICT) Industry: Spatial Growth and Innovation Patterns, *Regional Studies* **43**(4), 605–624.

Nathan, M. and Rosso, A.: 2014, Measuring the UK's Digital Economy with Big Data, *NIESR Report*, National Institute of Economic and Social Research.

Oulton, N.: 2012, Long Term Implications of the ICT Revolution: Applying the Lessons of Growth Theory and Growth Accounting, *Economic Modelling* **29**, 1722–1736.

Pannone, A.: 2010, Production, Unemployment and Wage Flexibility in an ICT-Assisted Economy: A Model, *Structural Change and Economic Dynamics* **21**, 219–230.

Roland Berger Strategy Consultants: 2014, Industry 4.0: The New Industrial Revolution - How Europe will Succeed, *Roland Berger Report*, Roland Berger Strategy Consultants.