

Dynamische Wirtschaftsanalysen – erste Ergebnisse aus Forschungsprojekten mit AFiD-Daten

Freitag 21. Mai 2010

09:00 bis 11:15 Uhr

ENERGIE UND WASSER

Energy Efficiency in the German Industry Sector: Evidence from Micro Data

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Companies are faced with a limited set of options when responding to increasing energy prices and to the pressure to reduce emissions of greenhouse gases. The severity of this problem varies across sectors and industries, but it is especially serious in energy intensive economic sectors like metal manufacturers, refineries or the pulp and paper industry. Once fuel-switching opportunities are exhausted, the only option left is the substitution of capital for energy, through the adoption of energy-efficient technology embodied in new capital goods, i.e. a technological effort to reduce energy intensity. Apart from that, recent discussions show that on a macroeconomic level massive progress in the efficient use of energy as well as the decoupling of energy use and economic output is required to maintain the established level of welfare in developed countries.

While at a macroeconomic level the ratio between energy consumption and Gross Domestic Product or Gross Value Added is often used to gain insights about energy intensity, this ratio lumps together the pure technological component of energy intensity and structural effects. For example, if the composition of the industrial sector shifts from being relatively energy intensive (i.e. with a high share of energy intensive branches) towards a more energy efficient sector, the aggregate energy intensity of the industrial sector drops, although not a single production process has been improved in a technological sense. To disentangle the effects of scale, composition and technique in the development of energy intensity is one aim of our paper.

To study the economics of energy intensity, our analysis makes use of the “AFiD-Betriebspanel”, including its energy use module, the latter being a dataset which has just recently been made available by the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder. The AFiD-Betriebspanel comprises detailed yearly data from 66 000 German industrial companies with more than 50 employees between 1995 and 2006. Besides general economic data, also detailed data on energy consumption is included for recent years, which allows for a detailed analysis of the determinants of energy and carbon intensity in the industry sector in Germany.

Our study is the first to provide a thorough characterization of the energy use dataset, which has not been exploited before. We show that by mere examination of descriptive statistics and by performing simple statistical calculations we can draw intriguing conclusions concerning the development and sectoral differentiation of energy intensity. We then proceed

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to apply index decomposition techniques to determine the shares of structural and technological change in the development of energy intensities. Index decomposition techniques have been widely used to disentangle structural and technological components of energy intensity developments on the sectoral level. They make use of the fact that the industry-wide energy intensity can be regarded as a weighted average of sectoral energy intensities, where the shares of the individual branches provide the weights. We extend this approach to the company level. This allows for an even more profound assessment of technology-driven changes in energy intensity since we are able to consider cross-company differences, as opposed to only sectoral differences which are commonly the finest level of aggregation in decomposition analyses. This paper is the first step in an ongoing research project on the economic determinants of energy and carbon intensity of the German manufacturing sector.

Umweltschutzinvestitionen als Hemmschuh für die industrielle Beschäftigungsentwicklung? Eine Analyse auf der Basis einzelbetrieblicher Mikrodaten

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Zumindest bei nicht freiwillig vorgenommenen Umweltschutzinvestitionen wird vielfach vermutet, dass sich die davon betroffenen Betriebe in der Regel wirtschaftlich schlechter entwickeln als ansonsten vergleichbare andere Betriebe. Um diese These empirisch zu überprüfen, wurden mit Hilfe der aus dem Bereich Umweltschutzinvestitionen verfügbaren einzelbetrieblichen Mikrodaten sowie korrespondierender Daten aus der Industriestatistik betriebliche Arbeitsnachfragefunktionen geschätzt. Die für die baden-württembergische Industrie auf der Basis von Querschnittsuntersuchungen bereits jetzt vorliegenden Ergebnisse deuten darauf hin, dass Betriebe, die in den Umweltschutz investieren, sich hinsichtlich ihrer Beschäftigung in der Tendenz nicht schlechter entwickeln als andere Betriebe.

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Estimating the Value of Water for Industrial Production in Germany

Christoph Jeßberger und Dr. Markus Zimmer

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In this work we analyze the employment of water and its pollution as a factor of production. Therefore we develop a flexible theoretical framework to evaluate the shadow values of water and water-pollutants using a translog production-function. The framework does not impose assumptions about separability or homogeneity. It includes quasi-fixed production factors and proposes an extension to assess the shadow value of water which is consistent with the previous research but does allow for efficient use of water resources. In a second step we apply the framework to a data set of water intense German industrial sectors in order to estimate the shadow values of water usage and of pollutant emission and to identify complementary and substitutional factors of production. The framework has been proved to work and to yield plausible results for macro-data estimations (Jeßberger and Zimmer 2009). In this paper we aim to further develop the results for the new micro-data panel AFiD and thus to generate a deeper understanding and diversified picture concerning regional issues and differing industries.