

Vector autoregressions

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Valorization

“It is in the nature of the human being to seek a justification for his actions.”

- Aleksandr Solzhenitsyn (1918-2008)

In ancient Egyptian religion, Anubis weighs the heart of a deceased person against a feather. This feather represents ‘truth’ and the outcome of the weighing dictates the afterlife of the soul. These ancient Egyptians must have been happy people because their religion also provided guidelines on how to live a good life. When is a PhD student living a good PhD life? There seem to be very few concrete guidelines. In some sense, the mere notion that current dissertations require a valorization seems to indicate that we are not sure how to justify the time and money that has been invested into a PhD track. A quick search on the internet reveals a wealth of information on this topic. In the document by the VNSU entitled ‘*Een Raamwerk Valorisatie-indicatoren*’, one finds:

‘Dit document, het raamwerk, is een eerste fase in de ontwikkeling van die valorisatie-indicatoren. Het beoogt niet het definitieve antwoord te zijn waarmee het proces van valorisatie in beeld kan worden gebracht. Daarvoor is het te rein te complex en te zeer in ontwikkeling.’⁴

This quote (and also the document as a whole) shows how difficult it is to find objective guidelines to validate the work that is currently being carried out at universities. Finding

⁴The VNSU is the association of Dutch universities. In my own translation, the title of the document would read something like ‘*A framework for valorization indicators*’ and the given quote would translate as ‘*This document, the framework, is a first phase in the development of these valorization indicators. It does not aim to give the definite answer on how the process of valorization can be characterized. Valorization is too complex and too much in development to achieve this.*’. The document was featured as a main news item on the webpage of the VNSU as consulted on the 11th of February 2018. The document can be provided on request.

general criteria for valorization is apparently a difficult task. As such, I will put forward several arguments that for me personally justify these last couple of years.

In the course of this chapter I will discuss three components of my PhD work that I consider relevant for this valorization. The first of these is perhaps redundant in view of my earlier introductory chapter. I nevertheless mention again that vector autoregressions are widely used not only in economics but also in biology, climatology and finance.⁵ This broad applicability has a mathematical origin. The Wold representation theorem (e.g. theorem 2 on page 137 of Hannan (1970)) states that every covariance-stationary series has an infinite order MA representation. If this MA representation is invertible, then we end up with an autoregressive model of (possibly) infinite order. Finite VAR models can provide good approximations since the coefficients in this infinite VAR usually decline rapidly. As such, the success of VAR models can be explained by the flexibility of the original model (see Sims (1980)) as well as the multiple extensions and refinements that have been added during the last decades. Possible examples of such extensions are: cointegrated VAR models, mixed frequency VARs, factor augmented VARs, vector autoregressions with time-varying coefficients and the use of vector autoregressive models as approximations to dynamic stochastic general equilibrium (DSGE) models. As references for these topics one might consult Johansen (1995), Ghysels (2016), Bernanke et al. (2005), Primiceri (2005) and Giacomini (2013), respectively. This PhD thesis contributes towards a deeper understanding of the traditional VAR model. It can be interesting to investigate to which extend these aforementioned extensions can be combined with estimation methods based on least absolute deviations.

This thesis also contributed in two ways to the important topic of model uncertainty. Let me briefly elaborate on the meaning and relevance of the term model uncertainty. At least three steps are required to answer a research question by statistical inference: (1) the collection of data, (2) the specification of a statistical model, and (3) the estimation of the parameters in the model.⁶ Nowadays's information era makes the first step easier than ever before. Furthermore, the recent grow of computational power has greatly simplified the estimation of the parameters of any *pre-specified* model. Model uncertainty arises if we do not know exactly what the statistical model should look like.

Asking oneself how to decide on the lag order of a VAR model is a form of model uncertainty. We investigated this problem in Chapter 2. In that chapter we assessed the

⁵Searching for '*VAR model*' on Google Scholar provided some 3,520,000 results on the 10th of April 2018. A similar search for its univariate precursor, the AR model, even yields 5,530,000 hits.

⁶Additional steps such as model validation and the combination of several data sources can also be part of the statistical investigation, see Chatfield (1995) for additional remarks.

performance of the focused information criterion when the researcher is interested in impulse response analysis. The content of that chapter illustrates once more how the model choice or model average can affect the accuracy of the estimation results. Unfortunately, the Monte Carlo simulations reveal that no feasible method is preferred.

The investigation of the lag order uncertainty can be considered as a stylized problem. In reality, one would also need to verify the VAR model can be considered a good choice. I have reasoned in Chapter 3 that VAR estimation by both LAD and OLS might be used to reveal possible model specification issues.

Finally, let me slowly move away from the world of academic research. After all, valorization is also about *societal* impact. The knowledge I accumulated throughout my PhD can only reach society if it somehow diffuses from the research community into society. Teaching has appeared, appears and will always appear to me as one of the most successful ways to achieve this goal. I therefore feel privileged to have taught students with wide varieties of backgrounds and interests. There have been numerous possibilities to share basic concepts with undergraduates as well as advanced topics (even topics from my thesis) with graduate students. These students are tomorrow's workforce and will there utilize the concepts we taught them.

This is all I have to say on the topic of valorization. I leave it to you to take the scale and the feather.