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Financial Econometrics Course

Opening Remarks

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Good morning, welcome to the Digital Course on Financial Econometrics. Let me start by recollecting some key ideas, most notably, from the history of finance and econometrics, two influential subjects that have intersected for decades. Then, I will make some remarks on why central bankers should know financial econometrics.

Nowadays, many people take the existence and functioning of financial markets for granted. Although the implications of their inadequate functioning were patently seen during the Global Financial Crisis and its aftermath, on a day-to-day basis many take for granted their critical role within the economy and its importance for central banking. One could argue that much of humanity's progress in recent centuries is largely due to the development of financial markets. In effect, major projects in terms of size and time horizon, usually entailing a high degree of specialization and economies of scale, need certainty regarding significant capital provision.

As a historical case in point, Bagehot in his 1873 *magnus opus* Lombard Street portrays the advantage that England had over other nations due to the development of its financial system then. England not only had the ability to collect but also to allocate capital from parts of the economy where there was a surplus, to those where said capital was scarce. What is more, several economies turned to the English financial system for capital. Somewhat ironically, many had abundant domestic capital. Yet, it was not as obtainable as their financial systems were not fully developed.

In this context, although the existence of finance as a modern discipline of study is relatively young, it has had notable and very influential results. One could argue that this discipline began with papers such Markowitz (1952) on portfolio selection, and with that of Arrow (1953), a seminal paper that provided the foundations of the general equilibrium approach to the pricing of financial assets. The effort continued with the contribution of Modigliani and Miller (1958), who posited the well-known theorem in corporate finance, which picks up its name after their last names. Also, a central contribution was made with the capital asset valuation model (CAPM) of Sharpe (1964) and Lintner (1965). About a decade later, the famous paper by Black and Scholes (1973) was published. While it is better known for the valuation of financial options, its principles are also used for the valuation of companies. Interestingly, one can link the put-call parity to the Modigliani-Miller theorem. For option pricing, its results are used on a daily basis by financial institutions.

For its part, one could argue that econometrics started as a scholarly subject much earlier than finance. The terms in regression equations are due to Galton (1811–1911), who was a direct cousin of Darwin (1809–1882). Galton noted that the qualities that have characterized early generations tend to diminish in subsequent generations. Consequently, he had the notion that such qualities "regressed."

The regression model that influenced the development of econometrics was used by Fisher (1890–1962) in agricultural research. During the 1920s and 1930s, the estimation of demand curves was a major concern for economists. The main challenge arises from the fact that prices and quantities are determined by supply and demand simultaneously, as Marshall (1842–1924) had underscored years before and is nowadays well understood by economic undergraduate students.

In 1943, under Marschak and later, in 1948, under Koopmans, the Cowles Commission keenly researched the estimation of simultaneous equations. The methods for their estimating included maximum likelihood. At the time, a typical practitioner, however, faced the problem that such methods called for computing resources that were hardly accessible, resources that, by the way, you all can find in a laptop today. This was also complemented by a growing interest in large-scale macroeconometric models. These models were seen as a component to government decision-making process. As is known, Tinbergen developed a thorough large-scale model, which was first built for the Netherlands (Tinbergen,1937). The reputation of large-scale macroeconometric models was tainted in the 1970s. This took place once it was clear that their forecasting performance was commonly not as good as that of time series models.

In the same decade, cointegration analysis by Granger and Newbold (1978) gained impetus. They warned on the possibility of reaching spurious conclusions if regression models were fitted with economic and financial variables with trends. Thereafter, the analysis of Engle and Granger (1987) showed how to estimate equations systems that include cointegrating relationships. Having said that, multivariate equation models of cointegration often times cannot be easily fitted to economic and financial variables. Since then, econometricians, researcher and practitioners, have kept looking for even more amenable ways of modelling such variables.

For its part, Financial Econometrics is an interdisciplinary area and, as others in the profession, is in a constant state of flux. Quoting Fan (2004): “The boundary of such an interdisciplinary area is always moot and any attempt to give a formal definition is unlikely to be successful.” Broadly speaking, financial econometrics is a discipline that intersects several subjects, notably finance, econometrics, and computer science, among others, that studies quantitative problems in finance. In this course, you will explore some of its ideas, some of which took the profession years to develop.

Against this backdrop, I put forward the following question: why should a central banker be interested in learning financial econometrics? Let me offer the following preliminary answers. Financial markets are the point of contact between monetary policy and the economy. Gaining a better understanding of how financial markets work in general will make you a better central banker. Econometrics could be useful to quantifying how this has been the case. For known reasons, key to the monetary policy decision making is the nature of the macroeconomic shocks. Thus, identifying the nature of such shocks, notably their origin and possible dynamics, is essential for policy. In this regard, financial econometrics can be useful. Central banking operations divisions need to understand and gauge financial market conditions. In measuring how these changes take place through time and states of nature, financial econometrics can be useful. Financial stability has been a concern for central banks for years. What is more, in the aftermath of the GFC, many central banks gained new responsibilities in this respect, some of them *de facto* and others *de jure*. Thus, being conversant with the tools of financial econometrics is relevant for financial stability divisions.

All in all, understanding, designing and regulating financial markets is not a task for the faint of heart. The above, not only to have a better understanding of the financial markets themselves, the positive aspect of the subject matter, but also to have the ability to implement improvements in regard to the design and regulation of such markets, the normative aspect of it. Therefore, I believe that there are several reasons why central bankers should have a good understanding of financial markets. In this context, financial econometrics can provide you with powerful tools to do so.

Thank you.

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