



these periods. Also, geographically and economically closer countries exhibit higher levels of market linkages, as suggested by previous authors, and the Japanese market, in general, presents a low comovement with the other countries considered. Finally, the importance of historical transmissions has decreased in the last decade, with the exception given for the period 2007–2009.

## sampling in engineering and mathematics

paulo jorge ferreira<sup>1</sup>, saburo saitoh<sup>2</sup>, paul butzer, rolf stens, gerhard schmeisser, rowland higgins, maurice dodson

<sup>1</sup> department of electronics, telecommunications and informatics & IEETA, university of aveiro  
<sup>2</sup> department of mathematics & CIDMA, university of aveiro

In 1900, David Hilbert put forth a collection of problems that he believed could shape the course of mathematics in the twentieth century. In his famous address to the International Congress of Mathematicians of 1900 he mentioned ten of those problems. The expanded version of his speech, published soon after the congress, contained 23 problems. Hilbert’s notebook mentioned yet another one, related to the question of “simplicity of a theorem” and the role of “equivalences”:  
 “Criteria of simplicity, or proof of the greatest simplicity of certain proofs. Develop a theory

of the method of proof in mathematics in general. Under a given set of conditions there can be but one simplest proof. Quite generally, if there are two proofs for a theorem, you must keep going until you have derived each from the other, or until it becomes quite evident what variant conditions (and aids) have been used in the two proofs. Given two routes, it is not right to take either of these two or to look for a third; it is necessary to investigate the area lying between the two routes...”  
 Part of the interest in equivalence groupings is due to the information that they reveal about the area lying between the equivalent propositions. At IEETA, a team of senior researchers from 5 countries, partially supported by the FCT, has been investigating sampling (AMS subject classification 94A20), interpolation and Fourier analysis. The goal is to clarify the connection between these topics, which are of interest to both mathematicians and engineers, and lie at the heart of mathematical analysis. Simultaneously, the team has uncovered new results in the history of the subject. The results (more than 180 pages in 2011) have been published in mathematical and engineering journals, including The Journal of Fourier Analysis and Applications and Notices of the AMS, the most widely read journal in mathematics, contributing a great deal to the visibility of the e\_or.

