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Afriat's Theorem and Samuelson's 'Eternal Darkness'*

Matthew Polisson† Ludovic Renou‡

May 14, 2016

Abstract: Suppose that we have access to a finite set of expenditure data drawn from an individual consumer, i.e., how much of each good has been purchased and at what prices. Afriat (1967) was the first to establish necessary and sufficient conditions on such a data set for rationalizability by utility maximization. In this note, we provide a new and simple proof of Afriat's Theorem, the explicit steps of which help to more deeply understand the driving force behind one of the more curious features of the result itself, namely that a concave rationalization is without loss of generality in a classical finite data setting. Our proof stresses the importance of the non-uniqueness of a utility representation along with the finiteness of the data set in ensuring the existence of a concave utility function that rationalizes the data.

Keywords: Afriat's Theorem, concavity, revealed preference, utility maximization

JEL classification numbers: C60, D11

Suppose that we have access to a finite set of expenditure data drawn from an individual consumer, i.e., how much of each good has been purchased and at what prices. When is such a consumer's behavior consistent with the maximization of a stable preference over consumption goods? Afriat (1967) was the first to establish necessary and sufficient conditions on a finite set of price and demand observations in order to provide a definitive answer to this question. In this note, we provide a new and simple proof of Afriat's Theorem, the explicit steps of which help to more deeply understand the driving force behind one of the

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