

Markets and Measurements in Nineteenth-Century Britain

Aashish Velkar

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Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Mexico City

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press,
New York

www.cambridge.org

Information on this title: www.cambridge.org/9781107023338

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First published 2012

Printed in the United States of America

A catalogue record for this publication is available from the British Library.

Library of Congress Cataloguing in Publication data

Velkar, Aashish, 1969–

Markets and measurements in nineteenth century Britain / Aashish Velkar.
p. cm. – (Cambridge studies in economic history)

Includes bibliographical references and index.

ISBN 978-1-107-02333-8 (hbk.)

1. Weights and measures – Great Britain – History – 19th century.

2. Metrology – Great Britain – History – 19th century. 3. Great Britain –
Commerce – History – 19th century. I. Title.

QC89.G8V45 2012

530.8'1309034–dc23

2012000782

ISBN 978-1-107-02333-8 Hardback

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Markets and Measurements in Nineteenth-Century Britain

Measurements are a central institutional component of markets and economic exchange. By the nineteenth century, the measurement system in Britain was desperately in need of revision: a multiplicity of measurement standards, a proliferation of local or regional weights and measures and a confusing array of measurement practices made everyday measurements unreliable. Aashish Velkar uncovers how metrology and economic logic alone failed to make measurements reliable and discusses the importance of localised practices in shaping trust in them. *Markets and Measurements in Nineteenth-Century Britain* steers away from the traditional explanations of measurement reliability based on the standardisation and centralisation of metrology; rather, the focus is on changing measurement practices in local economic contexts. Detailed case studies from the Industrial Revolution suggest that such practices were path dependent and anthropocentric. Therefore, whilst standardised metrology may have improved precision, it was localised practices that determined the reliability and trustworthiness of measurements in economic contexts.

AASHISH VELKAR is a lecturer in economic history at the University of Manchester. He won the 2010 Thirsk-Feinstein PhD Prize in economic history and the 2010 Coleman Prize for business history. Previously, Aashish held managerial positions at international consulting firms in South Asia.

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To my father, Deepak Velker (1944–1984),
for showing me the courage to be curious.

To my grandfather, K. S. Dhurandhar (1915–2003),
for teaching me that dreams can come true.

Acknowledgements

This book was inspired by the work I did between 2004 and 2009 as a doctoral researcher at the London School of Economics (LSE). My years at the LSE were spent exploring my interests at my own pace, unfettered by the responsibilities I previously had as a young corporate executive during the 1990s. I am indebted to the Department of Economic History at the LSE for giving me the freedom, in the form of a Carus–Wilson Research Studentship, to make this book possible in the first place.

The Economic History Society (EHS) provided generous support during my post-doctoral years, particularly in the form of the EHS Postan Fellowship (2008–2009). The fellowship allowed me to bring it all together and to extend my doctoral work in new directions. The Institute of Historical Research, London, provided me with an intellectual home during this fellowship. In 2010, the society’s Thirsk–Feinstein Dissertation Prize Committee and their decision propelled me to follow up my doctoral work with a book project, and I am grateful for their support and encouragement. The Association of Business Historians was equally generous with its assistance and provided opportunities to present many elements of my work to its members during this period. Its decision on the 2010 Coleman Prize for doctoral dissertations simply reinforced my efforts to bring the doctoral research together in this book.

I am also grateful to my friends and colleagues on the ‘How Well Do “Facts” Travel?’ research project for including me in their activities. This project was funded by the Economic and Social Research Council and the Leverhulme Trust, and their financial support made my participation in the Facts project possible. The project team prompted me to think in many different ways about the things on which I was working at the time. I have many fond memories of our weekly meetings and all the workshops held at the LSE during those years.

I would like to acknowledge the support of the University of Sussex and my colleagues in the Department of Business and Management during

2010 and 2011, as this book was finally taking shape. I would also like to acknowledge Taylor and Francis, the publisher of *Business History*, and Oxford University Press, the publisher of *Enterprise and Society*, for agreeing to let me reuse some of the material I had previously published in articles in their journals.¹

In many ways, the subject of this book was inspired by Ken Alder's colourful account of how the metric system was defined: *The Measure of All Things* (2003). Quite unknowingly, he set me thinking in a direction that eventually culminated in this volume. Many other scholars have knowingly and profoundly influenced my work since then. Martin Daunton and JoAnne Yates provided the initial encouragement and the subsequent intellectual support to transform my doctoral thesis into this monograph. My conversations with Ted Porter and Marcel Boumans were invaluable, inspiring and illuminating and provided unique perspectives for me to consider. Dudley Baines, Janet Hunter and Tim Leunig prodded me to think about the bigger picture during my early years as a graduate student at the LSE. More recently, collaborative work with Rajneesh Narula and David Higgins on other subjects has made me reflect upon the material for this book in different ways. Paul Strong, Roy Edwards and Xavier Duran frequently engaged in informal, friendly and challenging conversations about my work. Sabina Leonelli, Jon Adams, Ed Ramsden, Erika Mansnerus, Simona Valerani, Julia Mensink, Albane Forestier and others from the LSE Facts project kept the ideas flowing.

However, I reserve my greatest admiration for Mary Morgan and Peter Howlett, who patiently guided me through my doctoral research and beyond. They have had the most profound influence on this work and have encouraged me to push the boundaries of my abilities. They have given me personal, intellectual and moral support during these most challenging years of my life. The book may not have come to fruition if it wasn't for their constant and unwavering support.

My family has stood by my decision to pursue an academic career after eleven years in the corporate business world. Rashmi Velkar, Lata Dhurandhar and Minu and Kiriti Guha continue to extend unquestioning support to every decision I make. Elaine Morrison has unfalteringly

¹ A. Velkar, 'Caveat emptor: abolishing public measurements, standardizing quantities, and enhancing market transparency in the London coal trade c1830', *Enterprise and Society* 9 No 2 (2008): pp. 281–313, and A. Velkar, 'Transactions, standardisation and competition: establishing uniform sizes in the British wire industry c.1880', *Business History* 51 No 2 (2009): pp. 222–47.

stood by me in every way as this book was slowly taking shape: her patience remains immeasurable by any standard. I know I could show more appreciation for their support, especially that of Aparna Guha, who, against all odds (and reason!), believed in my decision many years ago to pursue my dream. She lent me her strength to be bold. To her I owe everything.

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1 Markets and measurements

An introduction

As we trace the history of our metrology from the beginning we shall have ample evidence of [considerable] effort which ensured that the exchange of goods was equitable, with the consumer relying ultimately on kingly support of his claim for justice in the market-place.

— R. D. Connor, *The Weights and Measures of England* (1987)

Metrology, mensuration and measurement practices

Measurements defined the foundations of justice, safeguarded property and ensured the rule of right, wrote Patrick Kelly in his book *Metrology* (published 1816). Kelly, an accountant, a mathematics teacher, former master of Finsbury Square Academy and an astronomer, argued that measurements were fundamental to all commercial and economic activity, as ‘productions of land and labour, or nature and art’ were estimated on the basis of weights and measures.¹ The diversity of weights and measures that prevailed ‘throughout the world’ greatly concerned him. As an expert on bookkeeping, currency exchange and other commercial matters, he reckoned that diversity must be an ‘interruption to trade and commerce’.² This diversity was well documented in a parliamentary report of 1820 that listed the immense variety of local and customary weights and measures in a thirty-page appendix.³ Kelly despaired that

¹ P. Kelly, *Metrology; or an exposition of weights and measures chiefly those of Great Britain and France* . . . (London, 1816). Ashworth describes Kelly as an ‘executive business astronomer’ as he was among the several business-minded people, such as Francis and Arthur Baily, Henry Colebrooke, Stephen Groombridge and Charles Babbage, who founded and were dominant within the Astronomical Society in London. W. J. Ashworth, ‘The calculating eye: Baily, Herschel, Babbage and the business of astronomy’, *The British Journal for the History of Science* 27 No 4 (1994).

² Kelly, *Metrology*. See ‘Introduction’. Kelly was also the author of *The universal cambist, and commercial instruction* (London, 1811), a text on coinage and currency exchange, and *The elements of book-keeping* (London, 1801), a text on single-entry and double-entry bookkeeping.

³ *Second report of the Commissioners on Weights and Measures*, [P]arliamentary [P]apers Vol. VII 1820, pp. 475–509.

although there were numerous plans for correcting this diversity by adopting universal standards, the plans were as 'visionary and impractical as proposals to establish a universal language'.⁴

British historians have generally echoed Kelly's views. The overall consensus in the literature on the long nineteenth century is that diversity and nonuniformity of weights and measures tended to disrupt internal trade.⁵ The presence of numerous local measurement units throughout the country is taken as evidence of how fragmented markets were in eighteenth-century England: 'a chain of local and regional markets at this date [rather] than as one emerging national economy'.⁶ There is little dissension within the historiography of British markets that the diversity in its weights and measures had a detrimental impact on transactions and market exchanges, created uncertainties and costs, erected internal barriers to free trade and ultimately inhibited market integration.⁷ In many other respects, late-eighteenth-century Britain may have been economically developed, but in terms of fragmented markets and diverse weights and measures, it was as undeveloped as the rest of Europe.

The confusing array of weights and measures was tidied up during the nineteenth century, especially through two major legislative reforms in the 1820s and 1870s. The Imperial system of weights and measures that was introduced in 1824 was the culmination of scientific, administrative and legislative efforts of scientists, MPs, civil servants and instrument makers in the late eighteenth and early nineteenth centuries. This reform of Britain's weights and measures, and the subsequent reform of 1878, eventually rid the statute books of duplicative and arcane acts, introduced a simplified and hierarchical system of measurement units and instituted a well-defined organisational structure to enforce this system nationally.

In many respects, this was a significant institutional change. Britain finally had a uniform system of weights and measures, a political quest that had been periodically attempted since the Magna Carta of 1225 had declared that 'there shall be one measure of wine, one measure of ale, and one measure of corn'.⁸ Britain was one of the few nations in Europe to have a unified metrology in the first half of the nineteenth century.

⁴ Kelly, *Metrology*, p. xi.

⁵ J. Hoppit, 'Reforming Britain's weights and measures, 1660–1824', *The English Historical Review* 108 No 426 (1993): p. 82.

⁶ G. V. Harrison, 'Agricultural weights and measures', in J. Thirsk (ed.) *The agrarian history of England and Wales*, Vol. VII, 1640–1750 (*agrarian change*) (Cambridge, Cambridge University Press, 1985), p. 815.

⁷ M. J. Daunton, *Progress and poverty: an economic and social history of Britain 1700–1850* (Oxford, Oxford University Press, 1995), p. 278.

⁸ House of Commons Reports (1738–65) 1758 Vol. II, *Report of the Carysfort committee on weights and measures*.

The other major European powers would not achieve this until later: France (c. 1840), Germany (c. 1870), Italy (c. 1860), Russia (c. 1920). They adopted the metric system that was developed during the French Revolution in the 1790s. Britain narrowly rejected adoption of the metric measures in 1871, voting to retain the Imperial measures as the basis of its national measurement system for at least another century or so.⁹

The recalcitrant attitude of the British state towards metric measures was born partly out of resistance to change. Mr Fothergill, industrialist and MP, pointed out the insurmountable difficulties in adopting the metric system and was certain that

[it] would be met with strong disfavour of the working classes, who knew the present system perfectly well and understood all its working, [and would] have all their habits and notions in regard to work and wages upset by the introduction of a new system.¹⁰

Reforming Britain's weights and measures was fraught with tension between those who held fast to local, customary measures and those who were the proponents of uniformity and standardisation.¹¹ Efforts to enforce legislated measures had historically been unpopular and were often met with stiff local resistance. In the eighteenth century, people in the south-west of England led a popular revolt against the imposition of the Winchester bushel by the state.¹² Such resistance was replayed in the nineteenth century too: the Winchester bushel, which was outlawed in the 1820s, continued to be used to measure grain in the 1870s. Reforming legal measures meant striking a balance between scientific ideals, administrative practicality and local resistance. Consequently, nineteenth-century reforms of British weights and measures were generally conservative as the reformers wanted to ensure the success of reforms.¹³

The scientific principles underlying Britain's new metrology were also the subject of bitter disputes and disagreements. There were vociferous

⁹ E. F. Cox, 'The metric system: a quarter-century of acceptance (1851–1876)', *Osiris* 13 (1958). R. D. Connor, *The weights and measures of England* (London, HMSO, 1987). R. E. Zupko, *Revolution in measurement: Western European weights and measures since the age of science* (Philadelphia, American Philosophical Society, 1990).

¹⁰ *Hansard Parliamentary Debates*. Series 3 Vol. 208. 26 July 1871. 'Weights and Measures (Metric System) Bill.' cc295.

¹¹ Hoppit, 'Reforming Britain's weights and measures'.

¹² R. Sheldon et al., 'Popular protest and the persistence of customary corn measures: resistance to the Winchester bushel in the English west', in A. Randall and A. Charlesworth (eds) *Markets, market culture and popular protest in eighteenth-century Britain and Ireland* (Liverpool, Liverpool University Press, 1996).

¹³ Hoppit, 'Reforming Britain's weights and measures'. This is true of reforms in the 1820s well as in the 1870s.

arguments about the length standard and whether it should be taken as the distance between two lines engraved on a bar or between the ends of a line engraved upon it.¹⁴ Joseph Whitworth and George Airy crossed swords on this issue more than once. Similarly, Whitworth's gauges, James Clerk Maxwell's electromagnetic measures or James Joule's measures of mechanical equivalent of heat were equally contestable and contested as scientific measurements.¹⁵ Telegraph engineers debated whether the size of telegraph cables should be expressed in terms of mass-length or diameter and whether they should be arranged on a geometric scale. Britain's new metrology was supposed to challenge traditional measurements and practices, and yet this new metrology was also expected to confirm existing knowledge through expert measurements. This apparent paradox, Schaffer argues, could only be resolved when Britain's new metrology was conceived as being traditional. Tradition on which the new metrology was to be based had to be newly invented and forged through public controversy and painstaking labour.¹⁶

Notwithstanding the political and scientific debates surrounding the reforms, the question is, did the reform of Britain's metrology affect internal trade? Did the introduction of uniform weights and measures help business groups overcome the measurement problems that contributed to internal barriers, trade disruption and uncertainty in market exchange?

The historical consensus is that it did. The long process of standardisation of British weights and measures is taken as a clear indication of the emergence of an integrated national market. Such conclusions rest on a major assumption: that there exists a direct correspondence between 'measures' (i.e. the system of weights and measures units) and 'measurements' (i.e. the information that the act of measuring captures). Existing literature implies that this direct correspondence is why multiplicity, nonuniformity or incoherency of historical measures translated into multiplicity, nonuniformity or incoherency of measurements, which in turn had the disruptive impact on trade and market exchange – the corollary being that the introduction of uniform and invariable measures eliminated unreliability in measurements, simplified economic transactions and helped integrate markets.

There is little distinction in most historical accounts between standardising measures and standardising measurements, and the former is

¹⁴ N. Atkinson, *Sir Joseph Whitworth: 'the world's best mechanician'* (Gloucestershire, Sutton, 1996). Chapter 5: 'The history of measurement'.

¹⁵ S. Schaffer, 'Metrology, metrication and Victorian values', in B. Lightman (ed.) *Victorian science in context* (Chicago, University of Chicago Press, 1997).

¹⁶ *Ibid.*, p. 467.