4 Quantification

Measuring Connections and Comparative Development in Global History

Pim de Zwart

Global history has flourished in recent decades,[1] but has also increasingly attracted critiques by various scholars, who suggest that (some) global histories have overestimated the importance of global connections for (local) events[2] or exaggerated the impact of a particular historical figure on the course of global history.[3] Quantification may provide a preventative bulwark against such critique. In this chapter, I will address the issue of quantification in global history. To what extent have claims in global history been backed up by quantitative data, and what are the potential benefits and pitfalls of quantification for the field?

To start with, it is important to establish what global history is. At the risk of oversimplifying, it seems that two types of global histories can be discerned: one that is focused on the analysis of global connections, or what is also termed 'global connectivity' or 'globalisation', and another that is concerned with making global comparisons.[4] The former may concern the circulation of knowledge and ideologies, ecological exchange, commodity trade and migration, but also political cooperation and conflict, and tends to relate global to local developments and vice versa. A second type of global history is concerned with comparisons between developments in different parts of the world. In particular, contributions to the debate over the 'Great Divergence', or the rising gap in economic performance between the West and the Rest, fall under this heading.

[1] Richard Drayton and David Motadel, 'Discussion: The Futures of Global History', *Journal of Global History* 13, 1 (2018), 1–21; Jürgen Osterhammel, 'Global History', in Marek Tamm and Peter Burke (eds.), *Debating New Approaches to History* (London: Bloomsbury Academic, 2019), 21–47.

[2] David Bell, 'This Is What Happens When Historians Overuse the Idea of the Network', *New Republic*, 26 October 2013.

[3] Cornell Fleischer et al., 'How to Write a Fake Global History', *Cromohs: Cyber Review of Modern Historiography*, September 2020. https://doi.org/10.13128/cromohs-12032.

[4] James Belich et al., 'Introduction', in Belich et al. (eds.) *The Prospect of Global History* (Oxford: Oxford University Press, 2016), 1–24. They suggest global history consists of three elements: comparison, connectedness and globalisation, but the latter two seem to be largely overlapping. I do not distinguish between global connectivity/connectedness and globalisation in this chapter but consider them the same.

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Both the assessment of global connections and systematic global comparisons may benefit from formal reasoning backed by quantitative evidence. In order to argue that the era of 'global connectivity' started in the eleventh, sixteenth or twentieth century, one needs to have some measure of 'global connectivity' to assess when there was *more* of it. Valerie Hansen suggests that only the *potential*, not the *actual*, presence of objects from Asia in a Viking settlement in the Americas around the year 1000 is enough to be considered the start of globalisation.[5] But there was no trade between the short-lived Viking outpost in Newfoundland and Europe, let alone Asia. Few historians will therefore agree that this was the defining moment when global connections crucially impacted the course of history.[6] But what *level* or *extent* of global connections is sufficient to be considered as globalisation? Even if we do not wish to define a particular threshold in numerical terms, we need some measure and criteria to assess the *increase/rise* or *decrease/decline* of global connectivity over time.

Analyses of the consequences of global connections for developments in some particular place imply the evaluation of causal claims, as well as the weight these claims may carry (*how much* did development X contribute to event Y). Causal claims additionally require a strategy to convince people that it was actually global factor X that had a positive relationship with local factor Y, and not factors A, B or C that were also taking place at that time – that is, that causation rather than mere correlation is involved here. Quantification helps with this, because by controlling for factors A, B and C, one can (try to) approach ceteris paribus conditions. Similarly, in global comparative history, measurement is crucial considering the language of comparisons: *equal to*, *more/less*, *higher/lower*.

Despite this need for formalisation and quantification, many historians, including global historians, do not use quantitative data and are sceptical, or even hostile, towards the systematic use of quantitative data. This is especially the case when such data are used to uncover general patterns in history, or when history is used to test social science models, as some quantitative historians do. Some historians refute the idea that human history could be properly understood by trying to uncover general patterns, as they emphasise the 'unique and particularistic nature of history'.[7] Humans, their motives and their actions are too complex to be captured by any general law.[8] As a result of such objections,

[5] Valerie Hansen, *The Year 1000: When Explorers Connected the World – and Globalization Began* (New York: Scribner, 2020).
[6] Fleischer et al., 'Fake Global History'.
[7] Robert William Fogel and G. R. Elton, *Which Road to the Past: Two Views of History* (New Haven: Yale University Press, 1983), 9.
[8] Fogel and Elton, *Which Road to the Past*, 9–10; Jared Diamond and James A. Robinson, *Natural Experiments of History* (Cambridge, MA: Belknap Press, 2013), 5.

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many historians have been driven away from testing their hypotheses based on quantitative data, and, more generally, explanation and the establishing of causal relations.

From the 1960s, some historians started the study of *cliometrics* (or quantitative economic history), which sought general explanations based on research that formulated hypotheses and rigorously tested these using empirical, often quantitative, data. In the following decades, cliometrics became influential among other historians. Even Lawrence Stone, who was highly critical of cliometric work, acknowledged the benefits of quantification in *Past and Present* in 1979:

> Historians can no longer get away with saying 'more', 'less', 'growing', 'declining', all of which logically imply numerical comparisons, without ever stating explicitly the statistical basis for their assertions. It [quantification] has also made argument exclusively by example seem somewhat disreputable. Critics now demand supporting statistical evidence to show that the examples are typical, and not exceptions to the rule.[9]

Yet he criticised the cliometricians for providing tables and graphs without giving sufficient, and easily accessible, description of the methodologies used to obtain those figures. This remains a problem to this day, and the increasing complexity of quantitative techniques leaves many historians without training in statistics unable to verify the findings of more sophisticated quantitative research. Especially in the United States, the barriers between historians in humanities departments and those historians influenced by the social sciences seem greater than ever.

Certainly, quantitative, like qualitative, evidence has many problems. When data are lacking, quantitative historians may provide estimates rather than actually observed datapoints. The assumptions underlying such estimates can and should be criticised. As new data and research comes to light, assumptions may need to be adjusted, and when the bias in a particular data source turns out to be more severe than expected, necessitating further modifications this necessitates further corrections. Yet a whole body of quantitative data should not be discarded too quickly. As in the case of qualitative evidence, it is important to see what story these sources may contain. Historical data are often inaccurate, but if the inaccuracies are random (such as typos made by local administrators), the quantitative evidence can still be used to obtain reliable estimates, as the average value obtained from such data (e.g. mean income in a country) will not be significantly affected (as, given enough observations, mistakes pushing the estimate upward are equally as likely as those pushing it downward). Furthermore, even if data are affected by bias (e.g. a source exploited to estimate average incomes in a country includes far more

[9] Lawrence Stone, 'The Revival of Narrative Reflections on a New Old History', *Past and Present* 85 (1979), 3–24, here 10–11.

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incomes at the bottom end of the income distribution than at the top), there are ways to account for such bias using additional information.

Additional problems arise when historical quantitative research relies on categories created by administrators in the past, such as colonial officials. In the Viceroyalty of Peru, colonial administrators created ethnic classifications (primarily for taxation purposes) that have very much persisted in statistical publications over time, but which ignore the complexities and changing nature of the social differentiations acknowledged by Peruvians themselves.[10] Any quantitative analysis of historical demographic databases that employ these colonial classifications will need to take this into account. It is imperative that scholars grasp the political context in which the registration of people (and their characteristics) takes place before such registry's data are employed in analysis.[11] Many historical developments are hard to capture in numbers and a focus on purely quantitative evidence would lead to availability bias (or the so-called 'streetlight effect'). For example, when examining clearly measurable indicators, like GDP, wages and life expectancy, a clear view of human progress over the last centuries emerges, while if one included variables that historically have not been extensively quantified, such as biodiversity and pollution, such a view may be reversed. Moreover, quantitative methods are better at establishing *whether* there *is* a relationship between certain variables, but are less suited to explaining *why* this relationship is there.[12]

It is easy to be overwhelmed by the issues related to historical quantitative materials, and some have concluded that because inaccurate statistics will (always) lead to inaccurate conclusions, especially when they are put in a global comparative framework, any attempt to write quantitative global history is better abandoned.[13] Many others disagree, as is evidenced, for example, by the contributions cited in the remainder of this chapter. Over recent decades, many new quantitative sources have been discovered and employed, methods have been developed and refined, and, consequently, views on global history have been *improved*: we know *more* about global history now, as a result of quantitative studies, than we did a few decades ago. Yet the historian has an obligation to be transparent about the problems with, and the reliability of, the data as a precondition for rectifying those

[10] David Cahill, 'Colour by Numbers: Racial and Ethnic Categories in the Viceroyalty of Peru, 1532–1824', *Journal of Latin American Studies* 26, 2 (1994), 325–46.

[11] Simon Szreter and Keith Breckenridge, 'Editor's Introduction: Recognition and Registration', in Simon Szreter and Keith Breckenridge (eds.), *Registration and Recognition: Documenting the Person in World History* (Oxford: Oxford University Press, 2012), 1–36.

[12] Angus Deaton, 'Instruments, Randomization and Learning about Development', *Journal of Economic Literature* 48, 2 (2010), 424–55.

[13] D. C. M. Platt, *Mickey Mouse Numbers in Global History: The Short View* (London: Macmillan, 1989).

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problems and moving – slowly but steadily – to a more accurate picture of world history.

In the remainder of this chapter, I will discuss how and to what extent quantitative evidence has been used in two main discussions in global history: (1) the debate over the origins of globalisation and (2) discussions surrounding the 'Great Divergence' in economic fortunes between the West and the Rest. Because of my own expertise, the focus of this chapter is on discussions in global economic history, but with implications for the field at large, as it is clear that quantification and its problems are not limited to economic history.

The Origins of Globalisation

A key question in global history is *when* and *how* the world became connected to such an extent that the history of the world, and its various components in terms of regions or countries, cannot be properly understood without taking those connections into account; in other words: when the process of *globalisation* started. For several decades, scholars have put forth suggestions regarding the point at which they believed the world had become a connected space. Eminent contributors to the debate, such as Fernand Braudel, Immanuel Wallerstein and Andre Gunder Frank, emphasised the creation of a global economic system from the sixteenth century on and its role in creating global economic inequalities.[14] Quantitative economic historians, such as Patrick O'Brien, Kevin O'Rourke and Jeffrey Williamson, objected to these views.[15] They suggested that the volumes and values of the commodities traded globally before the nineteenth century were insufficient to have had transformative effects. In particular, before the 1800s there were too many obstacles to intercontinental trade, in the form of monopolies, pirates and slow oceangoing ships, to allow the global integration of markets. The 'narrow focus' on quantification and integration was criticised by Dennis Flynn and Arturo Giráldez (among others), who suggested instead that global connections before the 1800s fundamentally impacted all parts of the world, in particular from the founding of Manila in 1571.[16]

[14] Fernand Braudel, *Civilization and Capitalism, 15th–18th Centuries*, 3 vols. (Berkeley: University of California Press, 1992), vol. 2: *The Wheels of Commerce*; Andre Gunder Frank, *Capitalism and Underdevelopment in Latin America: Historical Studies of Chile and Brazil* (New York: Monthly Review Press, 1969); Immanuel Wallerstein, *The Modern-World System*, 4 vols. (New York/Berkeley: Academic Press/University of California Press, 1974–2011).

[15] Patrick O'Brien, 'European Economic Development: The Contribution of the Periphery', *Economic History Review* 35, 1 (1982), 1–18; Kevin H. O'Rourke and Jeffrey G. Williamson, 'When Did Globalisation Begin?', *European Review of Economic History* 6, 1 (2002), 23–50.

[16] Dennis Flynn and Arturo Giráldez, 'Path Dependence, Time Lags and the Birth of Globalization: A Critique of O'Rourke and Williamson', *European Review of Economic History* 8, 1 (2004), 81–108.

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These different answers are the result of different *conceptualisations* of 'transformative connections' and 'globalisation', as well as differences in the *measurement* and the *empirical evidence* used to test the presence of those concepts in history and assess possible causality between global connections and transformative processes. It is therefore important to establish some definitions. For O'Rourke and Williamson, globalisation is equivalent to the *integration* of markets,[17] while for Flynn and Giráldez, globalisation concerns the *sustained interaction* among all of the world's heavily populated land masses on a scale that generated *deep and lasting impacts*.[18] Jürgen Osterhammel distinguishes between 'global history', which is the history of 'transformative connections', and the 'history of globalisation', which contains the added element of 'integration'.[19] Following Osterhammel, it seems that Flynn and Giráldez are concerned with the former (although they would themselves disagree), while O'Rourke and Williamson are dealing with the latter.

The concept of 'transformative connections' is relatively broad and not clearly defined. I will take a stab at it here. It contains two elements: 'connections' and 'transformation'. Flynn and Giráldez emphasise that the connections need to be 'sustained'.[20] We find this also in other works which emphasise the 'regularity' or 'stability' of connections.[21] Following the influential work of David Held et al.,[22] one may want to investigate in the 'intensity' of the connections, which concerns the volume and value of global trade, the numbers of migrants or the amount of international financial transactions. Looking at the political and cultural domains, one may be interested in the numbers of international treaties or the amounts of international movies in local theatres. Additionally, we may need to assess how geographically extensive the connections need to be in order to be considered 'global'. Abu-Lughod is content with contact between various integrated regions across Eurasia to talk of 'world-systems'.[23] For Flynn and Giráldez,[24] what they consider the three thirds of the world – with the Pacific Ocean spanning a third of the Earth's surface, the Americas and the Atlantic another third and Afro-Eurasia the final third – need to be in regular contact in order to count as global. Connections across Afro-Eurasia alone, in their view, certainly cannot count as globalisation.

[17] O'Rourke and Williamson, 'When Did Globalisation Begin?'
[18] Flynn and Giráldez, 'Path Dependence'.
[19] Osterhammel, 'Global History', 28.
[20] Flynn and Giráldez, 'Path Dependence'.
[21] Belich et al., 'Introduction'; Jürgen Osterhammel and Niels P. Petersson, *Globalization: A Short History* (Princeton: Princeton University Press, 2005).
[22] David Held et al., *Global Transformations. Politics, Economics and Culture* (Stanford: Stanford University Press, 1999).
[23] Janet L. Abu-Lughod, *Before European Hegemony. The World System AD 1250–1350* (Oxford: Oxford University Press, 1989).
[24] Flynn and Giráldez, 'Path Dependence'.

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What about the transformative effects, or what in the work of Held et al. and Flynn and Giráldez is termed 'impact'?[25] A crucial question is what do we consider 'transformative' or 'deep' and 'lasting' impacts?[26] For Wallerstein, the creation of a global division of labour is crucial,[27] and he notes that labour in the capitalist core of the world economy is free and remunerated with wages, while labour in the periphery is coerced. For Andre Gunder Frank and Eric Williams, the accumulation of capital is essential: because exchange in the world economy was unequal, this led to a flow of capital, or profits, from the 'periphery' to the 'core'.[28] These profits were consequently invested in the capital-intensive technologies of the Industrial Revolution in Britain. For the other parts of the world, global connections meant the deepening of poverty: the more a region in the 'periphery' was engaged with the world economy, the more 'underdeveloped' it became. For Flynn and Giráldez, the impact is not only economic but contains ecological, demographic and cultural elements as well.[29] They emphasise, for example, the importance of the American potato for the growth of the Chinese population. It is clear from these works that 'transformative' change may imply something different for different parts of the globe. For Europe it may mean an economic shift from agriculture to industry; for Asia it may mean the reverse (deindustrialisation). But global connections could also have led to a further entrenchment of pre-existing patterns and hinder development that could have taken place in their absence. The latter example may count as a deep and lasting impact, but 'transformative change' would be a misnomer. In the next section, we will look at the quantitative data that sheds light on this.

Measuring Connections

To assess the regularity and intensity of interaction in the early modern era, economic historians have relied on two sources: observations of prices of goods and volumes of trade flows from the accounts of internationally operating trading companies, as well as customs records.

First, prices of goods (and services) are at the centre of much economic history. They provide basic information about trends in supply and demand in (market) economies. In general, we know that when a product (or service) becomes more expensive compared to other goods or services, this is a sign of scarcity, while if a good becomes relatively cheaper this suggests an abundance

[25] Held et al., *Global Transformations*; Flynn and Giráldez, 'Path Dependence'.
[26] Flynn and Giráldez, 'Path Dependence'.
[27] Wallerstein, *Modern World-System*, vol 1, 126–129.
[28] Frank, *Capitalism and Underdevelopment*; Eric Williams, *Capitalism and Slavery* (Chapel Hill: University of North Carolina Press, 1944).
[29] Flynn and Giráldez, 'Path Dependence'.

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of supply. As O'Rourke notes: 'most economic data, like the quantities of output of various types of products in a country, require someone that counted these quantities, which, when we are counting the output across an entire city, province or country, implies a certain level of bureaucracy, which was generally lacking before the nineteenth century.'[30] Yet throughout history, from antiquity to the present, people and institutions have been buying and selling stuff. While most of these transactions went undocumented, many institutions, especially those that have been in existence for extended periods – such as churches, orphanages or chartered trading companies (such as the *Vereenigde Oost-Indische Compagnie*, VOC) – kept records of their incomes and expenses, and these have often have been preserved.[31] Additional price quotations can be compiled from price currents that were published weekly in some of the major urban commodity markets like Amsterdam and London.[32] By comparing such price currents with prices observed in, for example, the VOC's own accounts of the sales of their commodities at auction, it becomes clear that these are very closely correlated, giving credence to these figures.[33] Problems may arise if large institutions purchased in bulk and/or via long-term contracts with wholesalers, which implies that the prices paid by the institutions may be different from those in the local market place. By taking observations from a variety of such institutions in different cities, however, it is possible to compute price series that, at least in respect of the longer-term trends, seem robust. Economic historians have been compiling these price data since the late nineteenth century, and most of these figures are now relatively accessible. Drawing on the huge body of work on prices in economic history,[34] local series have been scrutinised for their reliability – for example, by checking whether price hikes can be related to local harvest failures or whether price declines are related to increased output and supply – and from this it emerges that price data are quite reliable overall.

Second, we have comparatively abundant information on early modern seaborne trade for two reasons: (1) it was conducted by large trading companies that kept extensive records of their activities; and (2) many states and cities from the late Middle Ages meticulously recorded seaborne trade for customs

[30] Kevin H. O'Rourke, 'The Economist and Global History', in Belich et al., *The Prospect of Global History*, 44–63, here 46.
[31] E.g.: N.W. Posthumus, *Nederlandsche Prijsgeschiedenis*, 2 vols. (Leiden: Brill, 1943–1964).
[32] J.M. Price, 'Note on some London Price-Currents, 1667–1715', *Economic History Review* 7 (1954), 240–250.
[33] Pim de Zwart, *Globalization and the Colonial Origins of the Great Divergence* (Leiden: Brill, 2016); Pim de Zwart, 'Globalization in the Early Modern Era: New Evidence from the Dutch-Asiatic Trade, 1600–1800', *Journal of Economic History* 76 (2016), 520–58.
[34] The literature is far too voluminous to cite here, but Robert C. Allen's seminal paper is a good start: 'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War', *Explorations in Economic History* 38, 4 (2001), 411–47.

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reasons. These data have been gathered, assessed and published for most European countries.[35] The trade between Europe and Asia in the early modern period is exceptionally well-documented because it was monopolised by a handful of chartered trading companies (the VOC, EIC, *Compagnie des Indes*, etc.) whose records on trade flows have been largely kept (only documents from the Portuguese *Casa da India* were lost in the Lisbon earthquake of 1755). These records allow for the construction of a complete image of Euro-Asian trade in the pre-1800 period.[36] For the trade between the Americas and Europe we are on significantly less firm ground, as that trade was operated by many smaller traders and not all those records have been localised. Nonetheless, on the basis of customs records in America and Europe and figures from the Spanish colonial fleet, some estimates of those trading volumes can be made as well, although the error margins are clearly larger.[37]

What can such data tell us about the regularity and intensity of connections? In the centuries before the discovery of the passage to India via the Cape of Good Hope, intercontinental connections – those between Africa, Asia and Europe – took place partially over land and partially across the seas. The overland routes between Europe and Asia, the Silk Road, thrived at various point in time: in antiquity when it connected Han China with the Roman Empire, or during the *Pax Mongolica* in the thirteenth and fourteenth centuries. Scholars such as Abu-Lughod have emphasised the importance of global interaction and the existence of early, non-Western 'world-systems' in the thirteenth and fourteenth centuries.[38] Overland routes, however, were vulnerable to political instability: armed conflict and bandits could severely disrupt trade flows for years. Connections along the Silk Road were thus not regular or stable. Neither were they intensive: volumes traded along those routes were small and amounted to only a fraction of the volume of goods brought back by Portuguese ships in the first decades of the sixteenth century.[39]

[35] See sources underlying Robert C. Allen, 'Progress and Poverty in Early Modern Europe', *Economic History Review* 56, Issue 3 (2003), 403–43; Jan de Vries, 'Connecting Europe and Asia: A Quantitative Analysis of the Cape-route Trade, 1497–1795', in Arturo Giráldez and Dennis O. Flynn (eds.), *Global Connections and Monetary History, 1470–1800* (Aldershot: Ashgate, 2003), 35–106.

[36] De Vries, 'Connecting Europe'.

[37] Jan de Vries, 'The Limits of Globalization in the Early Modern World', *Economic History Review* 63, 3 (2010), 710–33. De Vries based his work on studies such as Antonio García-Baquerro González, *Cadiz y el Atlántico (1717–1778): El comercio colonial español bajo el monopolio gaditano* (Sevilla: Escuela de Estudios Hispano-Americanos, 1976) and John R. Fischer, *Commercial Relations Between Spain and Spanish America in the Era of Free Trade, 1778–1796* (Liverpool: University of Liverpool, 1985).

[38] Abu-Lughod, *Before European Hegemony.*

[39] Ronald Findlay and Kevin O'Rourke, *Power and Plenty: Trade, War and the World Economy in the Second Millennium* (Princeton: Princeton University Press 2007), 140; Om Prakash, *European Commercial Enterprise in Pre-Colonial India* (Cambridge: Cambridge University Press, 1998), 34.

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It was thus only after *c*.1500 that intercontinental interactions became more regular, more intensive and more global. Trade was steady from then as each year a large number of ships left European ports for Asian destinations and even more sailed in the Atlantic triangular trade.[40] Overall trade volumes, both between Europe and Asia and between Europe and the Americas, increased substantially over the period between 1500 and 1800. Total volumes in Eurasian trade grew by an estimated 1.1 per cent per annum. Sustained over a period of 300 years, this implies a 25-fold increase of annual trading volumes: from 2,000 tonnes per annum around 1500 to 50,000 tonnes per annum by 1800.[41] Trade across the Atlantic, where distances were shorter and there was greater competition among a multitude of smaller traders, probably grew even faster.[42]

On the basis of a wide variety of studies of international trade in different countries of the globe (based on underlying customs and company records, as discussed earlier), O'Rourke and Williamson estimated that intercontinental trade grew by 1.06 per annum in the period between 1500 and 1800.[43] This implies that trade grew four times as fast as (estimates of) world population and more than twice as fast as (estimated) economic activity.[44] Over these three centuries, global connections, at least in terms of goods trade, thus became two to three times more important. Despite this impressive growth and the increasing importance of international connections, the total amount of trade as measured in quantities per person in many parts of the world remained remarkably low. The amount of Asian goods that landed in Europe was a measly 0.5 kg per capita per annum. For Asia at the end of the eighteenth century, the net inflow of silver constituted only 0.32 grams per person per annum,[45] which was less than 10 per cent of a daily unskilled wage in China.[46]

So, what were the impacts of this small but growing global trade on local developments? A clear indication that Vasco Da Gama's journeys mattered for European consumers are developments in the real price of pepper in Europe.[47] Over the course of the sixteenth century, the real price of pepper decreased fivefold, whereas before 1500 the real price had gone up. This implies that pepper was becoming more affordable for a wider range of consumers across Europe. In the seventeenth and eighteenth centuries in particular, when competition on

[40] De Vries, 'Connecting Europe'; De Vries, 'Limits'. [41] De Vries, 'Limits', 720.
[42] De Vries, 'Limits', 719.
[43] Kevin H. O'Rourke and Jeffrey G. Williamson, 'Once More: When Did Globalisation Begin?', *European Review of Economic History* 8, 1 (2004), 109–17.
[44] Findlay and O'Rourke, *Power and Plenty*, 305. [45] De Vries, 'Limits', 718.
[46] Robert Allen et al., 'Wages, Prices, and Living Standards in China, 1738–1925: in Comparison with Europe, Japan, and India', *Economic History Review* 64, s1 (2011), 8–38. The Chinese unskilled wage at the time was about 0.1 silver tael of 37 grams.
[47] Kevin H. O'Rourke and Jeffrey G. Williamson, 'Did Vasco Da Gama Matter for European Markets?', *Economic History Review* 62, 3 (2009), 655–84.

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oceanic routes became fiercer with the entrance of northern Europeans and total volumes increased further, many exotic luxuries came within economic reach of large parts of the population. Various studies have documented the rise in consumption, including among the lower middle classes, of goods such as sugar, coffee and tea.[48] It is difficult to understand this crucial European development, also known as the early modern 'consumer revolution', without acknowledging the importance of international trade.

For early modern Europe, where documentation is best, quantification of the impact of global trade has developed the furthest. Formal econometric analyses have established a positive relationship between the volume of international trade and the development in GDP, real wages and urbanisation in Europe.[49] For other parts of the world, where historical documentation of trade patterns and economic indicators is less abundantly available and where trade may have represented a smaller part of total economic activity, such exercises are largely lacking. Formal quantitative assessment of the slave trades for African economic development has focused only on current economic outcomes and contains little information about immediate impacts.[50] Assessment of the role of international trade on economic development in the early modern Americas, Africa and Asia thus largely consists of argumentative reasoning on the basis of recently calculated figures on urbanisation, GDP and real wages in different parts of the world.[51]

Measuring Globalisation

Thus far, we have looked at some of the price and trade evidence that has been used to say something about 'transformative connections' in the early modern era. But what about 'globalisation' or the study of 'integration'? Measuring global market integration is relatively straightforward. O'Rourke and Williamson note that the best evidence for market integration is that of the convergence of international commodity prices.[52] The main characteristic of a single market is a unified price structure: two shops on the same street offering the same product need to charge the same prices (unless there are

[48] Anne McCants, 'Poor Consumers as Global Consumers: The Diffusion of Tea and Coffee Drinking in the Eighteenth Century', *Economic History Review* 61, s1 (2008), 172–200.

[49] Allen, 'Progress and Poverty'; Daron Acemoglu et al., 'The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth', *American Economic Review* 95, 3 (2005), 546–79; Alexana M. de Pleijt and Jan Luiten van Zanden, 'Accounting for the Little Divergence: What Drove Economic Growth in Pre-Industrial Europe, 1300–1800?', *European Review of Economic History* 20, 4 (2016), 387–409.

[50] Nathan Nunn, 'The Long-Term Effects of Africa's Slave Trades', *Quarterly Journal of Economics* 123, 1 (2008), 139–76.

[51] Pim De Zwart and Jan Luiten Van Zanden, *The Origins of Globalisation: World Trade in the Making of the Global Economy* (Cambridge: Cambridge University Press, 2018).

[52] O'Rourke and Williamson, 'When Did Globalisation Begin?'

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differences in quality) in order to both maintain customers; '[s]imilarly, in a single international market, prices for identical commodities will only differ across locations to the extent that trade costs . . . make arbitrage expensive'.[53] Evidence of commodity price convergence also automatically implies that there is an (economic) impact of this globalisation, as a change in prices resulting from international exchange will result in a reshuffling of resources in those economies that experienced price shifts.[54] To give an example: the rise of the wheat trade between the United States and Britain in the nineteenth century led to a massive decline in wheat prices in Britain. This allowed for a transfer of workers from the agricultural sector to the manufacturing sector and thus a crucial change in the economy and society: from an agricultural to an industrial society.

When did global commodity markets become integrated? Following O'Rourke and Williamson, the answer to this question until recently was: in the nineteenth century.[55] Before that era, deficient shipping technology, information asymmetries and monopolies, as well as low trading volumes compared with total population meant that domestic prices remained unaffected by global trade and events. It was only after the Napoleonic wars that technological progress involving steamships and railroads, as well as the demise of monopolies by chartered companies, caused commodity prices to converge globally.[56] This view has been highly influential among economists, and many economic historians also tend to refer to the nineteenth century as 'the first age of globalisation' without bothering to explain why.[57]

Some recent research, however, has put this view in doubt. There is evidence of market integration along all major trade routes (between America and Europe, Africa and America, America and Asia, and Europe and Asia). Flynn and Giráldez had long observed a convergence of silver prices (expressed in gold) during both the seventeenth and eighteenth centuries, which – since silver was the main medium of exchange globally – clearly indicates integration of global markets.[58] Klas Rönnback's analysis showed price convergences for sugar between Brazil and Europe, coffee between Asia and Europe and tea between China and Europe, among others.[59] Additional evidence of integrating

[53] O'Rourke, 'Economist and Global History', 48.
[54] O'Rourke and Williamson, 'When Did Globalisation Begin?'.
[55] O'Rourke and Williamson, 'When Did Globalisation Begin?'; O'Rourke and Williamson, 'Once More'.
[56] O'Rourke and Williamson, 'When Did Globalisation Begin?'.
[57] For example, Patrick D. Alexander and Ian Keay, 'Responding to the First Era of Globalization: Canadian Trade Policy, 1870–1913', *Journal of Economic History* 79, 3 (2019), 826–61.
[58] Dennis Flynn and Arturo Giráldez, 'Born with a "Silver Spoon": The Origin of World Trade in 1571', *Journal of World History* 6, 2 (1995), 201–21.
[59] Klas Rönnback, 'Integration of Global Commodity Markets in the Early Modern Era', *European Review of Economic History* 13, 1 (2009), 95–120.

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Atlantic markets came from an analysis by Rafael Dobado-Gonzáles and others of a large database of prices in grain markets in the Americas and Europe.[60] They suggest that, at least regarding grain markets, transatlantic integration started during the eighteenth century. Extensive work on trade between Europe and Asia was recently done based on new primary materials extracted from Dutch East India Company (VOC) archives.[61] The VOC was the dominant party in the trade between Europe and Asia, responsible for 59 per cent of total Eurasian shipping in the seventeenth century and 44 per cent of the total in the eighteenth century. Most of the goods traded by the VOC exhibited price convergence between 1600 and 1800, and especially prices for those goods that became more important in the eighteenth century, such as textiles and tea, converged significantly. There is thus substantial evidence of price convergence across many goods and routes in the early modern era.

The integration of global commodity markets continued in the 1800s, after a temporary dip during the Napoleonic wars. Prices converged faster than in the preceding centuries.[62] Nonetheless, establishing a new chronology for the process of globalisation is important as it substantially alters our interpretation of the drivers of global inequality. If one considers the nineteenth century as the dawn of globalisation, this puts emphasis on the role of the Industrial Revolution in determining the gap between rich and poor, while seeing, for example, the activities of chartered trading companies and the Atlantic slave trades as being inconsequential for long-term patterns of development. On the other hand, establishing globalisation as an early modern process highlights the crucial effects of the Columbian exchange, early colonialism and the Atlantic slave trade, among others, in determining the current global income distribution.

The Great Divergence

The debate over the Great Divergence has spurred a huge amount of comparative global history research in the past two decades.[63] The main questions in this discussion concern the *when* and *why* of the rise in global economic inequality. The debate takes its name from the eponymous book by Kenneth Pomeranz, considered to be 'perhaps the most influential book in global history ever written'.[64] In a special issue of the *Journal of Global History*, Stephen Broadberry and Jack Goldstone both noted that Pomeranz put forth a decisively

[60] Rafael Dobado-Gonzáles et al., 'The Integration of Grain Markets in the Eighteenth Century: Early Rise of Globalization in the West', *Journal of Economic History* 72, 3 (2012), 671–707.
[61] De Zwart, *Globalization*; De Zwart, 'Globalization'. [62] De Zwart, 'Globalization'.
[63] See also Peer Vries, *Escaping Poverty: The Origins of Modern Economic Growth* (Vienna: Vienna University Press, 2013).
[64] Osterhammel, 'Global History', 12; Drayton and Motadel, 'Discussion', 6.

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quantitative thesis about the Great Divergence, containing suggestions about levels of urbanisation, consumption, trade and incomes, on the basis of very limited quantitative evidence.[65] The same can be said of the contributions of other scholars of the so-called 'California School'. R. Bin Wong suggests that both pre-industrial Europe and China experienced 'Smithian growth' and 'shared a common world of harvest insecurities and material limitations' in a book that contains only one table (on life expectancy), no graphs and hardly any quantitative observations.[66] Susan Hanley suggested that Japanese living standards and physical well-being before the Meiji Restoration were not much below that in Britain before industrialisation, while providing little quantitative evidence for Japan and almost no comparative information on material living standards in other parts of the world.[67] Prasannan Parthasarathi, who can be credited with bringing India into this discussion, based his assessment of a late Indo-European divergence on three observations of weavers' wages and three estimates of spinners' incomes in Southern India in the mid-eighteenth century, the 1790s and 1800.[68] In his book of 2011, he gives six separate observations of real wages in South India, of which only three support his argument of high wages, while he also brings three additional observations for Bengal (north-eastern India).[69] It is hard to be convinced of the core arguments given such a fragile empirical basis.

It is important to note that these works represent a response to the conventional view of an early rise of the West, which was not based on much (reliable) quantitative evidence either. These views, which suggested that Western Europe forged ahead of the rest of the world in terms of per capita GDP, urbanisation and living standards, were in terms of underlying quantitative data based largely on the work of Paul Bairoch and Angus Maddison.[70] Maddison's data of per capita GDP for non-Western countries pre-1820s were no more than conjectures.[71] It is only since the early 2000s that, in response to the work of Pomeranz and others, serious efforts have been made

[65] Stephen Broadberry and Jack A. Goldstone, 'Arenas in Global History', *Journal of Global History* 16, 2 (2021), 266–314; Kenneth Pomeranz, *The Great Divergence: China, Europe and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2000).

[66] R. Bin Wong, *China Transformed. Historical Change and the Limits of European Experience* (Ithaca: Cornell University Press, 1997), 31–32.

[67] Susan B. Hanley, *Everyday Things in Premodern Japan. The Hidden Legacy of Material Culture* (Berkeley: University of California Press, 1997).

[68] Prasannan Parthasarathi, 'Rethinking Wages and Competitiveness in the Eighteenth Century: Britain and South India', *Past and Present* 158, 1 (1998), 79–109.

[69] Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not: Global Economic Divergence 1600–1850* (Cambridge: Cambridge University Press, 2011).

[70] For a critique of their underlying data, see also Platt, *Mickey Mouse Numbers*.

[71] See Angus Maddison, *The World Economy: A Millennial Perspective* (Paris: OECD, 2003), 250–9 for his approach to estimating GDP for countries in Latin America, Asia and Africa before the 1820s.

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to improve the data, especially for non-Western countries. While studies have also compared other economic indicators, such as human stature and market performance,[72] the focus in the remainder of this chapter will be on the two indicators that have been most prominent in the discussion: real wages and GDP. Whereas Pomeranz observed that 'it seems likely that average incomes in Japan, China, and parts of Southeast Asia were comparable to (or higher than) those in Western Europe, even in the late eighteenth century',[73] most of the latest quantitative research suggests otherwise.[74] Establishing the correct chronology for the Great Divergence is, of course, an important prerequisite for understanding the reasons for that divergence.

Measuring Comparative Incomes: GDP

Per capita GDP is by far the most widely used and accepted variable to measure the development of economic performance and income in societies. GDP is an 'empirical construct that does not exist in the real world',[75] and its calculation has become exceedingly complicated due to both the rising complexities of modern economies and the increasing sophistication of statistical methods. There are three ways to estimate GDP – these being expenditure, output and income approaches – but the general idea is to get an overview of total economic activity in a country, measured at market value. For this, one needs to estimate either the total expenditure of consumers, investors and government (expenditure approach), an estimate of total goods and services produced in a society minus intermediates (output), or the total incomes obtained from land, labour and capital (income). These data are difficult to obtain and require various assumptions and choices. Dealing with technological change and the construction of a price index to correct GDP figures for inflation generates additional problems. Despite this, GDP still provides a good indication of how rapidly or slowly economies are growing.[76]

Difficulties in obtaining the necessary data increase when investigating GDP in the period before the late nineteenth century, when governmental statistical agencies started producing national statistics. Scholars need to make assumptions about the level of local consumption and production of food and clothing,

[72] For example, Roman Studer, 'India and the Great Divergence: Assessing the Efficiency of Grain Markets in Eighteenth- and Nineteenth-Century India', *Journal of Economic History* 68, 2 (2008), 393–437; Carol Shiue and Wolfgang Keller, 'Markets in China and Europe on the Eve of the Industrial Revolution', *American Economic Review* 97, 4 (2007), 1189–1216.

[73] Pomeranz, *The Great Divergence*, 49.

[74] As he himself had to admit: Kenneth Pomeranz, 'Ten Years After: Responses and Reconsiderations', *Historically Speaking* 12, 4 (2011), 20–5.

[75] Diane Coyle, *GDP: A Brief but Affectionate History* (Princeton: Princeton University Press, 2014), 24.

[76] Coyle, *GDP*, 136.

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for example, on the basis of wage and price developments and exploit the latest research on price elasticities of demand for these products (which allows estimation of consumed quantities).[77] In addition, even when there are relatively good estimates, assumptions need to be made to capture non-market income, such as the work of spouses within the household or food grown for domestic consumption. Further problems arise with non-marketed output, such as unpaid housework and 'black market' activities,[78] which are often substantial in pre-industrial economies.

As a result, historical GDP figures are generally expected and acknowledged to contain a certain margin of error.[79] There are methods to estimate such error, using information about the variability of the series and their underlying components; indeed, some recent historical GDP studies have calculated the margin of error.[80] Such error margins should be calculated in case errors are randomly distributed. Potential biases in data can be dealt with by calculating GDP series using a variety of assumptions to see how the results change and whether this alters the general picture sketched by the GDP numbers ('robustness tests'). Calculating GDP in different ways (expenditure, output and income) can also help increase the robustness of findings. Over recent decades, various scholars have gathered figures from state tax records, customs accounts, probate inventories, farm accounts and many other sources,[81] in combination with the latest tried-and-tested assumptions, to estimate new series of GDP from the late Middle Ages for a number of countries.

This new research into GDP largely upholds Maddison's earlier conjectures. The latest evidence confirms that around the year 1000, higher incomes per capita were reached in Song China than in (what is now) Britain, but this was hardly in dispute. Yet by 1400, for which new estimates on China have recently become available, incomes in (what are now) Italy, Britain and the Netherlands were already substantially higher. England was one of the poorer parts of Europe in the Middle Ages, while Italy was one of the richer areas, so 'it is likely that Italy was already ahead by 1300, and perhaps even earlier'.[82] The gap only

[77] If the price for a product changes, so does the demand for it. In general, when prices increase, demand declines. The extent to which this takes place (i.e. the price elasticity of demand) differs per product. Basic necessities generally have lower price elasticities (as people need to consume them to survive, no matter the price change).

[78] Coyle, *GDP*, 38.

[79] Jutta Bolt and Jan Luiten van Zanden, 'The Maddison Project: Collaborative Research on Historical National Accounts', *Economic History Review* 67, 3 (2014), 627–51.

[80] Jan Luiten van Zanden and Bas van Leeuwen, 'Persistent but Not Consistent: The Growth of National Income in Holland 1347–1807', *Explorations in Economic History* 49, 2 (2012), 119–30.

[81] See Stephen Broadberry, 'Accounting for the Great Divergence', CEPR Discussion Paper 15936 (2021).

[82] Stephen Broadberry et al., 'China, Europe, and the Great Divergence: A Study in Historical National Accounting, 980–1850', *Journal of Economic History* 78, 4 (2018), 955–1000.

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increased as GDP per head declined in China and would not return to 1400 levels until the twentieth century. The latest work on Japan shows lower incomes there than in China until the nineteenth century, and thus an even larger gap with the leading economies of Europe. The trend in Japan does suggest very slow improvement in incomes in the pre-industrial period. The first GDP estimates for India are available for 1600, when they are slightly higher than in China, but below those in Britain. After 1600 Indian incomes continuously decline, further increasing the gap. What is striking in the new research is that the gap between the economic leader in Europe and other parts of Europe was also very large. In the seventeenth century, average incomes in the Dutch Republic (now the Netherlands) were more than twice as high as in Britain.

On the basis of the problems outlined herein, even quantitative economic historians have been critical of historical GDP estimates. In particular, Deng and O'Brien have questioned earlier Chinese GDP estimates as they found the data to be of too low quality and not voluminous enough to produce consistent series of GDP or population. They argue that there are severe dangers in quantification on the basis of a limited and problematic body of evidence as the 'origins and accuracy of such figures are too rarely investigated or questioned'.[83] Stephen Broadberry (and colleagues) responded two years later by presenting a large body of new data that did exactly that: investigating and revising earlier estimates of Chinese GDP.[84] Furthermore, when Peter Solar pointed out problems with their government output data, they updated their figures to take his suggestions into account.[85] This shows the benefits of these quantitative approaches that are based on generally accepted comparative methodologies: as the assumptions and underlying data are discussed openly, they can readily be criticised and improved. New estimates are then easily entered into the same comparative framework.

Measuring Comparative Incomes: Real Wages

A further issue with per capita GDP is that it is an estimate of the average income in a society and may give little information about the standard of living of the majority of the population. While there is a clear correlation between GDP and various aspects of well-being, the correlation is not perfect, and GDP itself, as Diane Coyle emphasises several times, is 'not a measure of welfare'.[86]

[83] Kent Deng and Patrick O'Brien, 'China's GDP Per Capita from the Han Dynasty to Communist Times', *World Economics Journal* 17 (2016), 79–123.
[84] Broadberry et al., 'China'.
[85] Peter Solar, 'China's GDP: Some Corrections and the Way Forward', *Journal of Economic History* 81, 3 (2021), 943–57; Stephen Broadberry et al., 'China, Europe, and the Great Divergence: A Restatement', *Journal of Economic History* 81, 3 (2021), 958–74.
[86] Coyle, *GDP*, 40, 73–5, 91, 140.

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Due to a high degree of social inequality, large parts of a population can be denied decent schooling or healthcare, despite the relatively high GDP per capita of the states in which they reside. This, and the issues sketched earlier, have led to the search for alternative measures of living standards. Real wages – the purchasing power of an (often unskilled male building) labourer – represent a good alternative for the following reasons: (1) data on wages and prices are relatively widely available for a large number of countries far back in time; (2) as wage labour has existed since antiquity it requires no anachronistic concept or statistical artefact like 'GDP'; (3) it directly measures incomes of those at the lower end of the income distribution. Real wages studies essentially ask very basic questions: how much did the average person earn for a day's work; how did this change over time; and was a worker better off in Delhi or in London in the early 1800s?

But real wage comparisons are not without problems, either: how can the real value of the wage of a worker in medieval England, who lighted his house using wax candles and warmed himself by a fireplace full of firewood, be compared with a worker in the twentieth century who used electricity and a coal stove? Or how can the income of an eighteenth-century worker in England, who ate bread and meat and drank beer, be compared with that of a Japanese labourer in the same period who mainly consumed rice, beans and fish? In order to deal with this issue, Robert Allen developed a consumption basket based on necessary nutritional intake.[87] The aim of this methodology was to compare both the purchasing power of workers in the same region over time and the purchasing power of similar workers in different regions. A basket was defined that delivered the necessary nutrients, some 1,940 kcal and 40 grams of protein per day, mainly from the cheapest available staple in a region, as well as some required clothing and fuel (for heating and lighting). By defining a basket in this way, it was possible to compare the value of the wage relative to an early modern poverty line.

Using this methodology, real wages have been widely used in the Great Divergence debate and the last two decades have seen not only new estimates for various parts of Europe and North America, but also for China, India, Japan, Sri Lanka and Indonesia. On the basis of these newly gathered data, the basic conclusion of a comparatively early Great Divergence (significantly before the Industrial Revolution) is essentially confirmed. In contrast to GDP estimates, real wages are often taken from urban areas and thus reflect the standard of living in the capital, or another major city, of a country. The first global comparative figures for 1600 suggest there was already a gap in real incomes between workers in Europe and India. In particular, wages in Amsterdam were

[87] Allen, 'Great Divergence'; Allen et al., 'Wages, Prices'.

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substantially higher.[88] From the late seventeenth century, data for Batavia (now Jakarta, Java) become available, suggesting that these were also well below those in Western Europe.[89] Similar conclusions can be drawn on the basis of the evidence about Chinese and Japanese wages, with the latter in particular being at an extraordinarily low level.[90]

These real wage estimates have also received a fair deal of criticism. With regard to the high wages observed for London, the extent to which the observed 'wages' actually reflect the money that entered the pockets of local workers has been questioned, as opposed to the price paid to labour organisers and recruiters, who also retained a share of that money.[91] Taking this into account, London's real wages may have been about 30 per cent lower than earlier estimates suggest.

For China as well as South and Southeast Asia, critics of real wage studies have noted that as these were predominantly agricultural societies, the wages of often urban workers cannot be taken as representative for the income of the broader population.[92] Deng and O'Brien argue that wage rates cannot be compared across Eurasia because the ratio of wage-dependent workers is very different: in Qing China, wage workers represented about 3 per cent of the total workforce. By contrast, in the seventeenth-century Dutch Republic this figure may have exceeded 50 per cent,[93] and similar figures may be expected for England and other parts of Western Europe. Despite this, when labour markets function more or less freely, as they did in Qing China according to Pomeranz, one may assume a certain relationship between wages earned and the living standards of rural populations, at least in the long term. If wages represent a far lower standard of living than that earned by agriculture, simply not enough workers would show up to perform the necessary work. This labour scarcity would then increase wages to a level where it provides an attractive enough alternative to other activities. Similarly, wages cannot consistently represent a far higher standard of living than that earned by the average peasant in the countryside as that would likely cause an abundance of labour offered on

[88] Pim de Zwart and Jan Lucassen, 'Poverty or Prosperity in Northern India? New Evidence on Real Wages, 1590s–1870s', *Economic History Review* 73, 3 (2020), 644–67.

[89] Pim de Zwart and Jan Luiten van Zanden, 'Labor, Wages and Living Standards in Java, 1680–1914', *European Review of Economic History* 19, 3 (2015), 215–34.

[90] Allen et al., 'Wages, Prices'.

[91] Judy Stephenson, '"Real" Wages? Contractors, Workers, and Pay in London Building Trades, 1650–1800', *Economic History Review* 71, 1 (2018), 106–32.

[92] Kent Deng and Patrick O'Brien, 'Establishing Statistical Foundations of a Chronology for the Great Divergence: A Survey and Critique of the Primary Sources for the Construction of Relative Wage Levels for Ming–Qing China', *Economic History Review* 69, 4 (2016), 1057–182.

[93] Jan Lucassen, 'Proletarianization in Western Europe and India: Concepts and Methods', mimeograph, 2005.

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the market, which would put downward pressure on wages.[94] Therefore, as Bin Wong and Jean-Laurent Rosenthal write, 'we know that when economies are growing rapidly, wages rise, and when economies run into trouble, wages fall'.[95] Deng and O'Brien, while primarily focused on China, extend their critical claims of real wages studies to other parts of Asia, such as India. Yet for pre-modern India, in particular around Calcutta, most sources suggest a highly competitive labour market, where wages clearly responded to supply and demand. From the 1750s to the 1770s, there is evidence that when the wages offered by the British in Calcutta were not high enough compared with private employers, this resulted in a shortage of workers. When the British needed a large number of construction workers to build a new gun carriage factory in 1804, they were well aware that they had to set the wages high enough to attract sufficient applicants.[96]

Deng and O'Brien also dispute the evidence on which the Chinese wage series is based. As was the case with some of the price series discussed earlier, the sources of wage figures are often large institutions (governments, large companies, churches, etc.) that may not have paid market rates. Data on wages in China were gathered from such sources: government records (stating the costs incurred on construction projects), international companies (which hired labourers to load their ships), in addition to domestic firms (workers in local fuel stores). For Deng and O'Brien, these sources 'seem to be neither voluminous, transparent, nor contextualised enough to serve as proxies for average daily wages or for the standards of living afforded by the private sector of the Chinese economy to a definable group of unskilled urban and agricultural workers at the bottom end of an income distribution scale'.[97] In addition, they observe that these wages are difficult to interpret because the non-monetary incomes of workers (such as board and lodging) remain unspecified, and, as these payments in kind were often substantial, they cannot form the basis for any wage comparisons. Other critics have questioned whether incomes based solely on male earnings provide an accurate image of household earnings. If in one part of the globe the contribution of women and children was much higher than in others, this could have implications for the gap in incomes.[98] The little information that we have on female incomes does suggest that women had higher incomes (relative to men) in parts of Asia, but that even

[94] Deng and O'Brien ('Establishing') consider such assumptions to be false, although they present no evidence that contradicts such a model. Bin Wong and Pomeranz suggest functioning 'Smithian' markets: see Wong, *China Transformed*, 18–21; Pomeranz, *Great Divergence*, 80–91: 'the evidence we have so far does not suggest that European labor markets conformed more closely to neoclassical norms than did those of Japan or China', 90.

[95] R. Bin Wong and Jean-Laurent Rosenthal, *Before and Beyond Divergence: The Politics of Economic Change in China and Europe* (Cambridge, MA: Harvard University Press, 2011), 43.

[96] De Zwart and Lucassen, 'Poverty or Prosperity', 650–51.

[97] Deng and O'Brien, 'Establishing', 1703.

[98] Pomeranz, *Great Divergence*.

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including such incomes in the comparison is unlikely to close the gap.[99] Further issues have been raised regarding the seasonality of labour and the number of days per year and hours per week worked.[100]

What matters, however, is whether issues related to the data are likely to alter the conclusions that can be drawn from these studies. The latest research on real wages in the Great Divergence does not suggest that any of these issues may actually affect the levels and trends to such an extent that the current picture needs significant adjustment. One analyst of London wage series, Judy Stephenson, observed that, taking into account the money that ended up in the pockets of labour organisers, wages in London were probably still higher than those elsewhere in the early modern period, and that the overall picture sketched by the real wage work thus remains unaltered.[101] When Deng and O'Brien offer alternative observations of the number of calories obtained via unskilled wage labour in China, they suggest these data 'might also support an inference that the great divergence could well have been on stream for some time before 1700'.[102]

In order to arrive at final conclusions about the Great Divergence (as well as the origins of globalisation), one needs to look at a variety of indicators which, taken together, can show the full picture of economic development in an area. If there are large differences in the picture that emerges (e.g. between estimates of GDP and those of human stature or urbanisation), then it needs to be asked where these differences come from. Can they be explained convincingly, or do they suggest problems with (one of) the indicators? For now, it seems that most evidence, not only that on GDP and real wages, but also that on heights and urbanisation rates, points in more or less the same direction: to an early start of the Great Divergence.[103]

Conclusion

Over recent decades, economic historians have been feverishly gathering data on both global connections and comparative economic performance in different parts of the world. This recent research largely confirms many older

[99] Pomeranz, *Great Divergence*; De Zwart, *Globalization*; De Zwart and Lucassen, 'Poverty or Prosperity'.

[100] See, for example, John Hatcher and Judy Stephenson, *Seven Centuries of Unreal Wages: The Unreliable Data, Sources and Methods That Have Been Used for Measuring Standards of Living in the Past* (London: Palgrave Macmillan, 2018).

[101] Stephenson, '"Real" Wages?'

[102] They also suggest evidence showing the opposite, thus claiming the problems related to such figures. Deng and O'Brien, 'Establishing', 1077.

[103] For the size of cities, but also energy consumption, see Ian Morris, *The Measure of Civilization: How Social Development Decides the Fate of Nations* (Princeton: Princeton University Press, 2013), chs 3 and 4.

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insights, such as those put forth in the works of Immanuel Wallerstein and Angus Maddison. Global connections increased substantially over the early modern era and integration of global markets ensued. Efforts to formally estimate the impact of these connections for Europe suggest a significant positive association between international trade and economic outcomes. For other parts of the world, data demonstrating such links are less abundant, but it is certainly likely that the benefits of trade were not shared with most parts of Africa and Asia.[104] In addition, new estimates on GDP and real wages clearly go against the arguments of Pomeranz and other revisionists who have suggested that the Great Divergence took place in the decades following 1800.

Discussions surrounding the various issues related to the measurement of either globalisation or the Great Divergence are unlikely to stop anytime soon. Nor should they: for the process of knowledge accumulation in global history to take place, it is crucial that historians are transparent about not only the strengths but also the weaknesses of their data. When new data comes to light that suggest that, for example, the level of export trade in a certain country was substantially higher than initially thought, or that agricultural productivity was greater, this may mean an upward correction of GDP estimates and we may have to alter our views of the timing (and probably also the causes) of the Great Divergence. This is not a weakness of quantitative global history, but rather its strength. Because numbers can more easily be compared than qualitative information, and as the researchers are explicit about what is compared, new research can easily build on what is already available, gather new data for estimates that are shaky and investigate assumptions that seem disputable.

Quantification and the use of robustness tests with different assumptions allows such a validation and therefore presents a valuable contribution to global history research. This has put some earlier observations about the rise of a global economy and the divergence in living standards on a much firmer empirical footing and led to a more accurate chronology of these developments. It does not replace but complements qualitative research, especially since many historical events, processes and developments are difficult, if not impossible, to capture in numbers, giving rise to availability bias. It is hard to imagine a purely quantitative global history of philosophy, science or politics, even if it may aid in such endeavours. Quantification allows us to strengthen or debunk some claims about global trade and income comparisons, just as it obscures elements of world history that are less easily translated into numbers, making continuous conversations between quantitative and qualitative historians indispensable for an improved understanding of global history.

[104] De Zwart and Van Zanden, *Origins*.

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