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Vollmer, Hendrik

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Financial numbers as signs and signals: looking back and moving forward

By Hendrik Vollmer

University of Leicester, School of Management,
hv25@leicester.ac.uk

The idea that economic reality is represented by financial numbers is ubiquitous in economic discourse of all shapes and forms, micro and macro, theoretical and practical, mainstream and alternative. Michel Foucault's take in his lectures on governmentality on the economy as a sphere of intervention created by the efforts of bureaucrats and political advisors, by now a locus classicus for economic sociologists (Foucault 1991: 92-6), provides one particular image of the economic as something inspected from without by the numbers. This image has been instructive with respect to the history of statistics and the history of the social sciences more generally (e.g., Hacking 1990: 115-88).

At the same time, the image does not connect seamlessly with how people make use of numbers across markets and organisations: When market actors respond to prices or financial reports, the use of numbers as representations of some reality is often less important than the effect these numbers have (or are anticipated to have) on other actors; within organisations people also quite often appear much more concerned with what others will make of a measure than with whether a measure is true or false to begin with. The language of valuations, indicators, rates and rankings certainly captures a sense of "circulating reference" (Latour 1999: 24-79) but there is an important difference between the idea that a financial number as a sign indicates a reality out there to be acted upon, and the understanding that the number is indicative primarily by the very act of being a signal that is acted upon and acted with. If you are looking at a number as a *sign* – in terms of the information that has been put in – you are looking backward to what it represents. If you are looking at that same number as a signal – in terms of the message it is sending – you are looking forward to a receiver and the information to which he or she will respond (Clark 1996: 159-60; Skyrms 2010: 8).**1**

In addressing this difference between what financial numbers bring in as signs and what they bring on and about as signals, much has been made of the idea that numbers can be performative (Callon 1998; MacKenzie and Millo 2003). Part of the appeal of the concept of performativity in talking about financial numbers is that it presents an apparent alternative: either numbers will be determined by certain aspects of reality or certain aspects of reality will be determined by numbers. The distinction between signs and signals however suggests a continuum of ways in which numbers are used rather than a sharp demarcation – and significant overlap between signs and signals: a number that is a sign by virtue of referring to some slice of reality may also be a signal that makes people do something, and a number that is a signal will tend to rely on being understood as a sign to begin with.

It is perhaps on financial markets where prices are many things at once that such overlap between signs and signals becomes particularly apparent. The difference between signs and signals on the other hand, is particularly salient in situations in which it is clear that some information is being deliberately sent as a message rather than being just "given off" (Goffman 1959: 14-6). In such situations, messages are perceived as utterances that are clearly separate from the information involved in an act of communication (Luhmann 1995: 150-4) and as something that can be interrogated separately, for example for its motives or the effects intended by senders: You may register the information that is born by a number (as a sign) but you may also wonder what the sender is trying to accomplish by offering it to you (as a signal); the number may be a truthful representation (sign) and at the same time a poisoned message (signal), or, vice versa, an honest signal that uses a sign that has been compromised. When people are trying to do many things with numbers, as in the run-up to publishing a quarterly earnings report, the difference between signs and signals may not always be readily apparent, especially when communication has been designed to resist any such to unpacking. Just then the difference is of particular strategic importance: When you know that people may draw all kinds of conclusions and be pushed to all kinds of action by a number, you can ill-afford to let information inadvertently be given off. Against this background of the need to manage financial numbers not only as signs but also as signals in many settings of economic

activity across markets and organisations, it is surprising that the difference between signs and signals has received so little systematic attention among economic sociologists. It presents a gradual qualification of financial numbers in different settings and uses that can allow analysts to explore tensions and interdependencies between their distinct aspects and potentials as signs and signals.

From costly signals to coordination devices

The signalling potential of financial numbers is often associated with allegedly less rational aspects of market behaviour like selling or buying frenzies (e.g., Kindleberger 1989: 5-6). In such cases, financial numbers turn from signs into signals (to sell or buy in a hurry) not only for human beings but also for computers and algorithms (see Roberts and Jones 2009: 862; Pardo-Guerra et al. 2010). These actors are just as well and often significantly faster at "getting" a signal from market data. The signal character of, say, a price is not necessarily a matter of anybody trying to consciously send information forward to market participants but of market participants responding to what they think market data are telling them. In this sense, a signal is indeed a special kind of sign to be picked up from among the many signs floating around. It is up to the receiver to "get" the message from all the information set up for her in one way or another (Luhmann 1995: 139),**2** and what "the" market or "the" world is trying to tell her is retrospectively turned into an element of "getting it". Put in these terms, the signal character of certain financial numbers, whether their message is to sell, buy or hold, turns into something much less dramatic as when numbers are more or less seen to be 'screaming' at people. This signal character emerges from a process of separating information that is relevant from other information that might just as well be noise.

The most routine and everyday form of signalling well established as a topic in the broader socio-economic literature is job market signalling in the sense originally investigated by Michael Spence (1974). In this case, the message character of signals (levels of education, academic degrees, merits or marks) is very much apparent to the parties – potential employers and employees – involved in the signalling process. In Spence's model, signals are effective to the extent in which they are able to rank for employers applicants in terms of their productivity after having landed a job. Imposing signalling cost on senders is the mechanism for achieving respective separation between the more and the less productive applicants (Spence 1974: 14-28): if only productive applicants are able to afford a degree (merit, mark etc.), the degree can be a signal of productivity.

This idea of a cost condition establishing a message that is 'telling' to receivers of a signal has found wide applications across disciplines, from the investigation of status signals in a variety of markets in economic sociology (Podolny 2005) to biological investigations of evolutionary dynamics and signalling among, say, sticklebacks (Folstad et al. 1994; Milinski et al. 2010), to sociological explorations of recruiting problems in criminal networks (Gambetta 2009a). Take away the cost condition in any of these cases of signalling, and the difference between a sign that is 'cheap talk' and a signal that can be ratified as passing information on effectively about what people (or sticklebacks) are actually like will collapse (Gambetta 2009b: 178-83). Costly signalling through financial numbers takes many forms, the most notorious of which may be share buybacks (e.g., Vermaelen 1981; Bhattacharya and Dittmar 2008). Alongside workforce reductions, buybacks are the prevalent signals corporations use to demonstrate "shareholder value" (e.g., Lazonick & Sullivan 2000: 18f.). Both signals are manifestations of the "handicap principle" (Zahavi & Zahavi 1997): signalling firms reduce their capital, handicapping themselves and thus showing management's commitment to economize on assets and hand money back to shareholders rather than spend it otherwise.

It is worth re-emphasising that the ability to make out signals in all these cases rests completely with receivers, whether these are future employers, sticklebacks, traders or algorithms. Sending off a sign that is as costly however is a necessary but ultimately not sufficient condition for it to become a signal. If employers in Spence's original model are not convinced that academic degrees can tell them anything about productivity (see Spence 1974: 16-7), they will consider these degreess a form of "cheap talk"; if a female stickleback would not have inherited an attraction to a male's red flank (perhaps her father was a greyish but otherwise attractive guy), a male's redness would be for nothing (and might eventually phase out of the gene pool). There is therefore a certain scope here for potential bases of receivers' subjective inclination, learned, inherited or perhaps purposely built into an algorithm, to pick up a signal – despite the apparent objectivity of the cost condition. This need for an effective signal to appeal in some form or another to receivers does not in any way decrease the generalizability of the associated signalling model. If anything, it makes the model more general as the appeal

of the signal toreceivers may be brought about by a wide variety of means – from observing employees at work to evolutionary dynamics among bacteria to having read the Financial Times in the morning (also see Podolny 2005: 22-39). Though economic research has applied the concept of costly signals widely (see also Hoppe et al. 2009; Orzach and Tauman 1996), this dependence of a signal's effectiveness on what is essentially receivers' "practical sense" (Bourdieu 1990: 69) have not been explored to any extent.

Game theory in particular has certainly been associated with a strong stream of research in which the use of signals has informed the analysis of economic action more broadly considered. Schelling's understanding of coordination games with its prominent concept of focal points (Schelling 1960: 52-118) was received with some early enthusiasm also among sociologists – before Erving Goffman threw down the gauntlet and those who might otherwise have been well disposed to explore coordination game dynamics stayed clear ever since (Goffman 1969: 83-145; Vollmer 2013: 372-4). Instead Schelling's ideas became influential in analytical philosophy (Lewis 1969; Skyrms 2004) and over the years gathered some momentum among the game theoretically minded across disciplines – even if this has to some extent been overshadowed by a preoccupation with the prisoners' dilemma scenario and its alleged implications for the feasibility of human cooperation (see Riker 1992). In the coordination game scenario, receivers and senders have common interest in finding efficient coordination (focal) points among the many possible combinations of moves. However, the concept of focal points is meant to apply to the much greater set of mixed motive game scenarios (see Schelling 1960: 99-113).

The limited overlap of interests that is characteristic of mixed motive games (like the prisoners' dilemma) is characteristic of most market situations as buyers and sellers with diverse interest need to coordinate demands and offers. Credit ratings (Boot et al. 2005) as well as even forms of "cheap talk" have been found to affect market coordination in favour of both senders and receivers of signals (see Almazan et al. 2008; Qu 2013). Whereas the role of prices in coordinating market participants is very much apparent, this has not systematically been explored as a particular role for numbers as signals – despite the fact that on closer inspection it has to appear anything but unproblematic, not at least because of its association with market volatility (see Gintis 2007). This of course recalls the more dramatic implications of signalling dynamics in triggering herding-like forms of collective behaviour through what is effectively a "keynote" (Turner and Killian 1972: 47-8) to get going. At the same time, and perhaps more generally, such dynamics associate numbers with forms of coordination that can turn into stable conventions in the sense of Lewis (1969), for example in how people respond to prices or indexes.

That ongoing coordination would constantly reinforce the value of a signal (or set of signals) is the very point of the Schelling-Lewis perspective on signalling (also see Sugden 2004: 191-2). As with costly signals, the effectiveness of any number to work as a signal in this manner will need to imply a simultaneous sign character, in others words that receivers will see some reference of a number to a specific slice of reality, say, a commodity or asset. While one interesting implication of signalling game dynamics is the ability to explain the emergence of signs and larger vocabularies through the very process of signalling (Lewis 1969: 122-59), the limiting factor for the effective use of signals is again that a population of receivers adopts and retains the ability to pick up signals (also see Skyrms 2010: 48-62). As keen as economic research has been to adopt game theoretical models, this boundary condition for generating signals from sets of signs has also not been given much consideration in the case of convention-backed signals. But it may very well affect just about anything this research is about. Most critically perhaps, a proclivity among receivers to value certain signs more than others may upgrade certain signs into signals just as it downgrades others into noise, respectively affecting the ability of financial numbers to have an impact on economic activity – and potentially impairing the ability of financial numbers that are but mere signs to convince receivers of their relevance, if not validity.

Accounting and the problem of transparency

Such consequences of signalling on the consumption of financial numbers can hardly leave the production side unconcerned. If two kinds of information are involved in signalling – one put in by the sender, the other picked up by the receiver (Skyrms 2010: 8) – the production side in general and accounting practice in particular seem very much preoccupied with getting the first kind of information right. After all, putting the right kind of information into the right kind of place, for example into a financial statement, should be about getting the relationships between signs and economic substance right irrespective of which signs will become signals (which is either way up to receivers). The complications of reliably produc-

ing accounting numbers and financial statements as "circulating references" (Latour 1999: 24-79) of economic realities in this manner have been duly noted, both with respect to the degree of reality construction that appears unavoidably involved in such production (e.g., Hines 1991) and with respect to the lack of an alternative to the ideal of representation (McSweeney 1997). However, it is perhaps with respect to the understanding of accounting as generating a particular form of visibility, which has been highly productive in acknowledging both its reality creating and reality reflecting aspects (Hopwood 1990), that the production of financial numbers is most directly affected by uncertainty among consumers.

This uncertainty has often been expressed as a concern with the level of transparency. The metaphor of transparency is interesting because, like the idea of accounting visibility, it suggests that financial numbers should improve stakeholders' sight of some economic substance. The call for transparency articulates a concern with being able to see the right kind of information about this substance. Rather than a wish of making everything visible, the call for transparency is a concern with seeing what is important, a concern about the ability to 'see through' to the real (e.g., Fung et al. 2007: 5-6). With respect to accounting, this is a second-order concern about the proper form, level, or quality of making things visible (see Jordan & Messner 2012: 546-7; Nielsen & Madsen 2009: 852-3). Accounting struggles with resolving this concern – since how could it get itself out of the way for stakeholders to 'see through'? In order to provide visibility, accounting after all will need to put *some* numbers in the field of vision.

Nevertheless, the concern with transparency among stakeholders is hardly irrational. That numbers get in the way is part of the contemporary workplace experience. Not just accountants but all kinds of organisation members are mobilised to make visible their efforts and feed them into management information, enterprise resource or performance measurement systems (e.g., Quattrone & Hopper 2006; Cushen 2013). That people struggle to meet their targets and perhaps find ways of accomplishing them that were not quite intended can nowadays be treated as common knowledge with respect to the possibility of "exploitive fabrication" (Goffman 1974: 103-11) when in need to come up with certain numbers. Stakeholders who have seen the likes of Enron and Lehman Brothers fall will hardly imagine accountants to be above the fray.

Academics of course are no exception to any of this, and our experience of being measured, rated and ranked has dramatically increased interest in understanding the dynamics of quantification. The verdict of "reactivity" (Espeland and Sauder 2007) in particular expresses concerns with the ability of numbers to provide accurate and serviceable information in terms of a measurement problem. The verdict resonates with Foucauldian assumptions about the use of numbers among those made visible by these numbers. In terms of "the government of the self by the self" (Langley 2007: 72; Cushen 2013: 327-329), reactivity may be an effect desired by stakeholders wishing to impose the work of monitoring on those being monitored. Common knowledge about the playability of financial numbers and the possibility of exploitive fabrication, however, will block such a Foucauldian route towards trusting numbers to bring about discipline. This again points to receivers' practical sense as a limiting factor to any signal's validity – or, in this case, the lack thereof. Interestingly though it is often *not* the character of numbers as signals which suffers primarily from being not quite believable at face value. Instead their character as signs is called into question. In the same sense that shareholders may feel that share buybacks do not tell them anything interesting about a company's assets or strategies but still signal commitment to shareholder value, the scepticism towards numbers that receivers assume to have been "played" may hollow out accounting signs with respect to anything else than the circulation of signs, models and conceptual assumptions in which they are involved according to the rules of the game (see Macintosh et al. 2000). This may give rise to a certain cynicism with respect to financial numbers that rarely anybody would believe in as signs (e.g., of some 'underlying' economic reality) while still trusting them as signals (e.g., in moving markets).

The accounting profession can ill-afford to have accounting devolve into a kind of hyperreality machine. Its reputation continues to depend on its ability to convince stakeholders that accounting provides and safeguards numbers that are both valid as signs and can be effective as signals. Any signalling function of financial numbers will have to rely on the reliability of the sign function, i.e. will need to be backed up by a belief that a number represents something meaningful to begin with. If accounting is seen to either stand in the way of economic substance or to just provide a superficial façade for something more substantial happening behind the scene, then the serviceability of accounting signs as potential signals cannot but erode.

One of the major problems in dealing with this situation appears to be the lack of an easy answer to the question, how to improve the signalling quality of accounting signs once stakeholders have lost trust in them. Accounting standard-setting with its emphasis on ideals of representation relies on a convention-based form of signalling that appeals to a common-sense understanding of objectivity (Hines 1991) and tries to mobilise at least some trust in numbers by staying within the area of public dispute indicated by authors like Porter (1995). If the belief in the power of numerical expertise, however, is not conventional at least to the extent that stakeholders will tend to play along with it (Lewis 1969: 152-9), an alternative mechanism will be required that would effectively separate those who send reliable signals from all the others. Investments into standard-setting are unlikely to solve this problem, since almost by definition standards provide recipes for pooling rather than for separating signallers. The assumption of such pooling of course tends to be that informative differences will be visible to receivers after standards of signalling have been applied indiscriminately but, again, this would rely on the improbability of exploitive fabrications. The twin-character of standards as rules for regulating as well as for fixing and gaming the use of numbers in statements and reports has long been seen in the literature on creative accounting (Shah 1996: Waskey 2014: 5). The technical literature about signalling dynamics in financial reporting is certainly sophisticated but where it tries to offer practical guidance for reporting, it has to acknowledge that pooling is to some extent endemic (see Guttman et al. 2006: 835-6).

Moving on with the numbers, forward to consumers

There are, to conclude, two kinds of information relevant to signalling processes: the information put into a number by a sender and the information retrieved from it by a receiver (Skyrms 2010: 8). The first one can be associated with the sign character of financial numbers, the second with their ability to become a signal. The preceding considerations suggest that signalling dynamics will tend to privilege the latter over the former. As a result, a lot of information may be lost in the circulation of financial numbers, most of which never become – or at some point cease to be – signals, possibly to the detriment of stakeholders that miss out on them.

For economic sociologists and accounting scholars this suggests that the engagement with financial numbers as a generic topic of research needs to be extended toward a closer inspection of what goes on among receivers as consumers of numerical information. The Foucauldian literature has made big strides in investigating the involvement of financial numbers in political discourses and the technologies of governing (Rose and Miller 1992) but it has tended to treat the character of financial numbers as signs (of economic and social regularities, populations, selves etc.) as a given. Government is certainly one major type among consumers of financial numbers but the process of consumption itself is complex (see Graham 2008), cannot be taken for granted but so far has too rarely been unpacked.

Examining more closely how receivers affect the ability of numbers to provide information is one way in which sociologists could contribute widely to both the understanding of professional practice in accounting and finance and the understanding of signalling more generally (also see Connelly et al. 2011: 60-1). The circulation of specific bits of information by numbers is not automatic but neither is it accidental or entirely irregular. In other words the circulation of financial numbers, including the dynamics and tensions within investing and retrieving information from them, appears wide open for analytical engagement, and such engagement should not remain the prerogative of the more technically-minded among social scientists.

Signalling is not confined to human senders and receivers; animals do it, bacteria do it (Skyrms 2010: 20-32). In contemporary economic action, and increasingly in social life per se, a lot of signalling is done by non-human non-organic actors: information-processing machines and algorithms. If the effectiveness of a signal ultimately comes down to the ability of receivers to pick it up, this may suggest that these actors have been set up by human engineers to participate in signalling – perhaps in a way initially conforming to the needs of some human receiver. Even if that was the case, the brief considerations offered here suggest that the sheer amount of signalling that is brought about through the work of information-processing devices would still have a considerable and not entirely tame effect on the information that market actors (humans and non-humans) would respond to (Roberts and Jones 2009: 862-5). A sustained engagement with the consumption of financial numbers as signs and signals will need to interrogate the participation of algorithms, laptops, servers or apps as much as the involvement of flesh-and-blood stakeholders and their embodied "practical sense" (Bourdieu 1990: 69).

Non-human participation in processing signs and signals can be expected to increasingly affect the production of financial numbers by accounting and finance professionals, pressing the preparation of accounts, statements and reports to anticipate non-human readers. Maybe these users can be "made up" or regulated in a way simulating the ideal readers envisaged by accounting standard-setters (Young 2006). However, if effective signalling through financial numbers depends on stakeholders' practical sense and if some of these stakeholders' very access to these numbers is mediated by non-human actors who upgrade certain numbers into signals and others into noise, how could standard-setting alone keep pace with such dynamics? Stakeholders' intuitions about the meaning, relevance and validity of financial numbers are informed by models, algorithms and all kinds of other mediations quite beyond the control of professional bodies. For the moment, accounting and finance professionals in the field are left to their own devices and allies in chasing such dynamics. In the spirit of active professionalization, economic sociologists should be keen to throw themselves in the mix.

Hendrik Vollmer *is Senior Lecturer at the School of Management, University of Leicester. He received his PhD in sociology from Bielefeld University, Germany, where he worked for 16 years, lastly as senior editor of Zeitschrift für Soziologie. His main areas of research are social and organisational theory, the sociology of calculation, accounting, disruption and disaster. After the publication of his postdoctoral research* The Sociology of Disruption, Disaster and Social Change *(Cambridge UP 2013), Hendrik has moved to the UK in order to further develop his interests in social studies of accounting and finance. Hendrik is a member of the editorial board of* Accounting, Organizations and Society.

Endnotes

1 Clark (1996) and Skyrms (2010) diverge significantly in the way they employ the concepts of sign and signal. The differentiation here between signs and signals with respect to financial numbers adopts Clark's intuition that as signals they require some sign character but otherwise follows Skyrms' understanding of two kinds of information involved in signalling – while bracketing all other (and certainly much finer) aspects of a wide-ranging discussion.

2 This is not to say that all the other information would make no difference whatsoever. Such a claim would not only contradict the very definition of information (Bateson 1972: 315) but would also collapse differences in how people respond to the world into one simple opposition between signals and noise (e.g., Silver 2012).

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