‘That which is lacking cannot be counted.’

(Ecclesiastes I:15)

5

The Development of Normative Uses of Quantification

> The notion of government has been simplified: numbers alone make laws and the law. Politics has been reduced to a question of arithmetic.
>
> Alexis de Tocqueville, *The Old Regime and the Revolution*[1]

SOME REMARKABLE HISTORICAL scholarship has been carried out over the last 30 years on the quantification of economic and social facts in the modern era,[2] showing the state's concern with perfecting instruments to measure its wealth and population. The most important of these instruments is *statistics*, a term derived from the German *Staatistik*, a 'science of the state' (*Staatswissenschaft),* but whose contents actually corresponded more to what in England was called 'political arithmetic'. The difference was that *Staatistik* sought to give an overall picture of the state without using quantification, whereas 'political arithmetic', or statistics, was entirely based on quantitative surveys.[3] Although, in both cases, the normative uses of quantification seem to have the state as their central protagonist, in fact they were first developed in the private sphere, to assist in business management. We shall therefore start with this corporate sphere, before examining the much better known history of the rise of public statistics and calculations of probability. From the different uses of quantification, both private and public, we shall be able to tease out its four normative functions, as they developed historically: accounting; managing; judging; and legislating.

[1] A de Tocqueville, *The Old Regime and the Revolution*, Vol II, *Notes on the French Revolution and Napoleon* [1856], tr AS Kahan, ed and intr F Furet and F Mélonio (Chicago, University of Chicago Press, 1998) Ch 5, 57 [*tr mod*].

[2] *cf* F Bédarida, J Bouvier, F Caron, I Cloulas, Marec, Briand, Desrosières, et al, *Pour une histoire de la statistique*, Vol 1 (Paris, INSEE/Economica, 1987); P Cline Cohen, *A Calculating People: The Spread of Numeracy in Early America* [1982] (London, Routledge, 1999); L Daston, *Classical Probability in the Enlightenment*, 2nd edn [1988] (Princeton, Princeton University Press, 1995); A Desrosières, *La Politique des grands nombres. Histoire de la raison statistique* (Paris, La Découverte, 1993, 2000 (2nd ed)); TM Porter, *Trust in Numbers. The Pursuit of Objectivity in Science and Public Life* (Princeton, Princeton University Press, 1995).

[3] On these differences, *cf* A Desrosières, La Politique des grands nombres (ibid) 28ff.

I. ACCOUNTING

Accounting ledgers are doubtless the first modern expression of the link made between numbers and law, quantification and legal obligation. In its *Commercial Code*, French law defines the 'financial obligations applicable to all traders' in the following terms:

> *Article L 123-12*—All natural or legal persons with the status of trader shall enter in their accounts the movements affecting the value of their company. These movements shall be recorded chronologically.
>
> These persons must check the existence and value of the assets and liabilities of the company by means of an inventory at least once every twelve months.
>
> They must prepare annual accounts at the end of the financial year in view of the entries made in the accounts and the inventory. These annual accounts shall consist of the balance sheet,[4] the profit and loss account[5] and an annex, all of which shall form an inseparable whole.
>
> *Article L 123-14*—The annual accounts shall be honest and truthful and shall ensure a fair representation of the assets, financial situation and results of the company.
>
> Where the application of an accounting requirement is not sufficient to ensure the fair representation indicated in this article, additional information must be provided in the annex.
>
> If, in an exceptional case, the application of an accounting requirement proves to be unsuitable in order to ensure a fair representation of the assets, financial situation or results, an exception must be made to this. This exception shall be indicated in the annex and duly reasoned, with an indication of its effect on the assets, financial situation and results of the company.

In this definition, accounting operates within four legal parameters. First, *the obligation to prepare accounts*. Merchants must be able to account for their activities before third parties, and preparing accounts is part of this commercial liability, which is not solely to contracting parties but beyond this to the state and the public in general.[6] The term 'accountability' precisely contains an idea of financial liability, requiring an *accountor* (who must render account), an *accountee* (to whom the accounts are submitted) and an *accountant* (who prepares the accounts). Today, accounting obligations are enshrined in law, but in the medieval period, when modern accounting was

[4] The balance sheet shows the company's assets at a particular moment, namely at the end of the accounting year.

[5] This account shows the profit and losses for the accounting period, and justifies the overall result.

[6] The concept of 'commercial liability' does not seem to have been studied for itself in recent doctrine. See the nomenclature of the tradesman's responsibilities in Jacques Mestre, Isabelle Arnaud-Grossi, Laure Merland, Marie-Eve Pancrazi, Nancy Tagliarimo-Vignal, *Droit commercial*, 29th edn (Paris, LGDJ, 2012) 249ff, 236ff.

first invented, they were stipulated by the guilds, or what Berthold Goldman has called the *lex mercatoria*.[7] Later, the Italian city states made book-keeping obligatory for merchants, as a system of proof and a way of preventing bankruptcy. Etymologically, 'bankruptcy' is the destruction of the bench; that is, the counter the bankrupt merchant had occupied in the marketplace. From the outset, then, keeping accounts was one of the merchant's responsibilities.

Secondly, accounting is a way of *accrediting a truth through an image*. The notion of 'fair view' (in French, '*image fidèle*'; a faithful image), which recurs in Article L 123-14 of the French Commercial Code (introduced via the European Directive no 78/660/CEE of 25 July 1978) is an abbreviation of the English formula, 'true and fair view'. The accounting image thus has the status of an icon: religious icons unite a community of the faithful around a religious truth, just as accounting images federate a community of merchants around a legally backed truth. With this shared faith in a divine guarantor for pledges made, merchants could obtain credit from one end of Europe to the other.[8] As late as the nineteenth century, many industrialists placed their accounting books under the protection of God. And inversely, when the accounting image proves deceptive, such that it can no longer inspire collective belief, the whole community falls apart. This is what happened with the American company *Enron*. Having risen to stratospheric heights on the stock exchange, it crashed over a couple of weeks at the end of 2001, when the accounting ploys on which its apparent wealth had been based became known.[9] The Sarbanes-Oxley Law passed by the American Congress in 2002 showed the lessons learnt: the law strengthened accounting regulations and attempted to break the collusion between companies and audit firms, but more importantly it reactivated the old religious principle on which the veracity of accounts is based, by obliging the heads and financial directors of quoted companies to certify their books under oath. Foreign companies trading on the US markets were under the same obligation, with stiff penalties for non-compliance.[10] The accounts must be a true and a fair image because they are a vital pillar of the market system, a point of articulation of the true and the just. As such, accounting standards necessarily

[7] B Goldman, 'Frontières du droit et lex mercatoria' in *Archives de philosophie du droit*, (Paris, Dalloz, 1964) 177; and, by the same author: 'La lex mercatoria dans les contrats et l'arbitrage internationaux: réalités et perspectives', *Clunet*, 1979, 475. P Lagarde, 'Approche critique de la lex mercato-ria ' in *Le Droit des relations économiques internationales. Études offertes à Bertold Goldman* (Paris, Litec, 1987) 125–50.

[8] *cf* A Supiot, *Homo juridicus. On the Anthropological Function of the Law*, tr S Brown (London, Verso, 2007) 153ff. (With this shared faith in a divine guarantor for pledges made, merchants could obtain credit from one end of Europe to the other.)

[9] See M-A Frison-Roche (ed), *Les Leçons d'Enron. Capitalisme, la déchirure* (Paris, Autrement, 2002).

[10] See P Lanois, *L'Effet extraterritorial de la loi Sarbanes-Oxley* (Paris, Éditions Revue Banque, 2008).

refer to a certain representation of justice, and are not simply politically neutral technical norms. Only ignorance, or the wish to mask this political dimension, can have led the EU to entrust accounting standardisation to a private agency, the International Accounting Standards Board (IASB).[11]

Thirdly, accounting is also the first modern system to have *conferred on numbers the value of a legally backed truth*. As the French Commercial Code states, the figures acquire probative force: 'Article L 123-23—Duly kept accounts may be accepted by the courts in order to act as proof between traders in respect of commercial instruments'.[12] The way these figures were arrived at, and the many qualitative decisions taken to get there, simply fall away, unlike what occurs when a law has been passed or a contract has been signed. For whereas laws or contracts are expressed in a natural language and so remain open to interpretation, numbers are not accessible in this way. The dogmatic value assigned to numbers in certified accounts is not absolute, however. An Annex which 'shall supplement and comment on the information given in the balance sheet and the profit and loss account' confirms that the accounting presentation is true and fair, when this cannot be perceived from the figures alone.

Lastly, accounting is *the first technique to have made money into a universal standard of value*. Money makes different things commensurable.[13] Its function as a unit of measurement is different from its function as a means of payment, and there is no reason why the two should be conflated, as we do today.[14] In a barter economy, one should be able to exchange a consultation with a doctor for a certain number of bottles of wine, by referring each to the same unit of account. This unit would simply serve as a reference for both parties, and not as a means to dissolve the obligation, which is only done by handing over the bottles. The idea of separating these two functions of money recurs periodically. Keynes, for instance, tried to do this after the Second World War when he proposed an accounting currency which he called the 'bancor' as an international monetary reference, to protect the economy from national currency manipulation (and from the hegemony of the dollar—which is why Keynes's proposal failed). More recently, the French statesman Jean-Pierre Chevènement proposed a similar uncoupling, in order to compensate for the evident design faults of the single European currency.[15]

[11] Regulation (EC) No 1606/2002 of 19 July 2002.

[12] French Commercial Code, Art L 123-23.

[13] *cf* above, ch 4, pp 76–77.

[14] Money has yet another distinct function, as a reserve currency, which raises other problems. On the legal analysis of these different functions, see R Libchaber, *Recherches sur la monnaie en droit privé* (Paris, LGDJ, 1992).

[15] J-P Chevènement, *1914–2014. L'Europe sortie de l'histoire?* (Paris, Fayard, 2013) 295ff. And on this defect, F Lordon, *La Malfaçon. Monnaie européenne et souveraineté démocratique* (Paris, Les Liens qui libèrent, 2014).

The euro could indeed cease to be the means of payment in France, without even having to change the provisions of the Commercial Code, which states that 'The accounting documents shall be expressed in Euros and drafted in the French language' (Article L 123-22)'.[16] Ever since the Bretton Woods agreement was abandoned in 1971, money has been treated as a commodity like any other, but this can only be sustained if its function as a measure of value is concealed. On any market worthy of the name, the weights and measures which are the common reference enabling exchange to take place cannot themselves be treated as things to be exchanged. The refusal to consider this foundational function of money inevitably ruins any market economy.[17] Be that as it may, accounting exploits money's function as a standard of value, to measure not only the value of existing goods of all sorts, but also credit-worthiness, or, more generally, future values. In other words, the word 'accounting' is deceptive: it precisely does not count (in the sense of enumerating things of the same nature); rather it evaluates; and it evaluates not only what is, but also what may be, using money as a way of taming the future.

This first form of government by numbers was not introduced by states, but by businesses. Although accounting techniques already existed in antiquity, especially in Ancient Rome,[18] it was in the medieval era that modern accountancy emerged, with the keeping of personal accounts and later the invention of the *partita doppia*, the double-entry system, by the merchants of large Italian towns.[19] This system solved the problems raised by the expansion of credit. Books in which the inflow and outflow of goods and money were entered as they arose were not suitable for credit arrangements with suppliers or clients. If I have granted a credit of 1,000 florins to a client, I can never be absolutely certain that I will recover the sum, so I cannot enter it as an available asset. By the same token, if I have a debt of 1,000 florins with a supplier, it must figure on the books, even if these 1,000 florins are still in my account. To give a faithful representation of these operations, merchants therefore opened specific accounts: 'client' and 'supplier' accounts for the operations of credit; and 'sales' and 'purchases' for the corresponding transfers of goods. They then opened more specific

[16] French Commercial Code, Art L 123-22.

[17] *cf* L Fantacci, La *moneta. Storia di un' istituzione mancata* (Venice, Marsilio, 2005) 276; S Jubé, *Droit social et normalisation comptable* (Paris, LGDJ, 2011) 63ff.

[18] For the case of Rome, see G Minaud, *La Comptabilité à Rome. Essai d'histoire économique sur la pensée comptable commerciale et privée dans le monde antique romain* (Lausanne, Presses polytechniques et universitaires romandes, 2005).

[19] On this history, see J-H Vlaemminck, *Histoires et doctrines de la comptabilité* (Bruxelles, Treurenberg, 1956); (Brussels, Treurenberg Press, 1956; rpt. Vesoul, Pragnos Press, 1979); Y Lemarchand, *Du dépérissement à l'amortissement. Enquête sur l'histoire d'un concept et de sa traduction comptable* (Rennes, Ouest Éditions 1993) 719; S Jubé, *Droit social et normalisation comptable* (Paris, LGDJ, 2011) 673.

accounts corresponding to the elements of their wealth which could be identified as a source of expenditure or income. All these books were kept in the same accounting currency, which could be different from the currency used for payment. When a sale occurred on credit, the same sum was entered in the 'sales' and in the 'clients' account. When this debt was settled, the sum was entered in the 'clients' and the 'cash' accounts. Thus any economic operation gave rise to at least two accounting entries. This is why historians regard keeping separate accounts for credit operations as the origin of double-entry book-keeping.

In the words of the great German historian and sociologist Werner Sombart—to whom we owe the word 'capitalism'—'capitalism and double-entry book-keeping are absolutely inseparable; their relation to one another is as form to content'.[20] The invention of the double-entry system went hand in hand with other legal techniques which were also highly successful—bills of exchange, discounts, endorsements and trusts. When analysed closely, all of these credit transactions reveal the dogmatic basis on which the market economy rests: they are all implicitly backed up by a third, who acts as a guarantor. The normative force invested in numbers through these key innovations was closely linked to the introduction of algebra in Europe.[21] The arithmetical and geometric figures of equality used by Aristotle to illustrate his theory of justice only allowed known magnitudes to be compared. With algebraic equations, *equality became a question*, and algebra could help arrive at the numerical value of a certain number of unknowns.[22] Double-entry book-keeping exploited these new techniques. It brought within the sphere of calculation elements which had previously been excluded: not only the money one has, but all the resources mobilised for one's trade; not only the value of one's present goods, but also an estimation of future values. Additionally, double-entry book-keeping gave the legal principle of equality a new systematising power, since charts of numbers were organised according to a rigorous principle of equal rights and obligations.

[20] W Sombart, *Der moderne Kapitalismus. Historisch-systematische Darstellung des gesamteuropäischen Wirtschaftslebens von seinen Anfängen bis zur Gegenwart* [final edition, 1928] (Berlin, Duncker & Humblot, 1986); passage translated into French by M Nikitin in *Cahiers de l'histoire de la comptabilité*, 2, 19ff., quoted by B Colasse, *Les Fondements de la comptabilité* (Paris, La Découverte, 2007) 10. See also W Sombart, *Der Bourgeois. Zur Geistesgeschichte des modernen Wirtschaftsmenschen* [1913], English tr as *The Quintessence of Capitalism: A Study of the History and Psychology of the Modern Business Man*, tr and ed M Epstein (New York City, EP Dutton, 1915).

[21] The first systematic exposition of double-entry book-keeping was in the work of a mathematician and monk, Luca Pacioli, entitled *Summa de arithmetica, geometria, proporzioni et proporzionalita* (Venice, 1494). But it makes up only one chapter of this work, which remained famous for introducing algebra into the West, from Arab scholars. Pacioli also elaborated the notion of 'divine proportion' (see above, ch 4, p 72), which he took as the title of a later work illustrated by Leonardo da Vinci (*De Divina Proportione* [1509], French tr G Duschesne and M Giraud (Librairie du Compagnonnage, 1980)).

[22] I owe this insight to Pierre-Yves Narvor, philosopher-scholar and mathematician.

This new form can be discussed alongside the contemporary invention of the laws of perspective, which conferred a comparable objectivity on depictions of reality.[23] Tables of figures (or, later, statistical tables) can be regarded as a sort of portrait, an objective *figuration* of reality. The French language already points to this meaning, through its designation of the chart of accounts as a *tableau chiffré* (literally, a *figured table* or *figured painting*). Michel Foucault famously gives a foundational role to painting in his 'archaeology of the human sciences'.[24] However, painting is only one way of projecting an image onto a flat surface. It should be relativised by two others: the map and the mirror.[25] 'The merchant's mirror,' a metaphor often used to describe accounting, and found in the title of Richard Dafforne's 1636 treatise on book-keeping, published in London, *The Merchant's Mirrour, or Directions for the Perfect Ordering and Keeping of his Accounts*,[26] can be regarded as a precursor of our legal concept of 'faithful image' or fair view. What gives double-entry book-keeping its originality and power is that fundamentally heterogeneous things, people and operations are presented as a coherent and homogeneous whole, by the use of a unit of account which 'views' them all from the same perspective, showing the relative importance of each one's place in the financial life of the company. The laws of perspective result in exactly the same ordering effect, since the size of each object in a painting will be exactly proportional to its distance from the spectator's viewpoint, irrespective of any qualitative criteria.

Of course, this objectivity is as fabricated in the case of book-keeping as it is in painting, where the composition will vary according to the spectator being addressed, and the desired effect. Today's dominant accounting regulations, which are Anglo-American, have always privileged the viewpoint of investors; the financial reports accordingly seek to gain their trust, and to enable them to form an opinion on the accounts. In mainland Europe, by contrast, the accounting tradition has always addressed the state, particularly the tax authorities: it is for them that a company's accounts should appear transparent. And the books would look different again if the privileged viewpoint were that of the people whose work keeps the company going. At present, employees are regarded as a liability and an expense.[27] This is one of the reasons for share-price-induced redundancies, which

[23] *cf* S Jubé, 'De quelle entreprise les normes comptables internationales permettent-elles de rendre compte?' in A Supiot (ed), *L'Entreprise dans un monde sans frontières* (Paris, Dalloz, 2015) 147–63.

[24] M Foucault, *The Order of Things. An Archeology of the Human Sciences*, (London, Tavistock Publications, 1970).

[25] VI Stoichita, *L'Instauration du tableau* (Genève, Droz, 1999) 207ff.

[26] Quoted by Y Lemarchand, 'Le Miroir du marchand. Norme et construction de l'image comptable', in A Supiot (ed), Tisser le lien social (ch 2 fn 47) 213.

[27] *cf* on this point Jubé, Droit social et normalisation comptable (n 19).

automatically show up as 'value creation', whereas in reality they drain the lifeblood of a company, sometimes bleeding it to death like an over-greedy vampire. So, there is nothing mechanical about the recording of numerical data, not even according to the same accounting standards. The information is filtered through a range of possible presentations, highlighting or playing down this or that aspect, in a process of window dressing or, at the other extreme, of 'creative accounting' close to cooking the books. However, none of this will be visible in the final financial statements and, if well executed, they will have the persuasive self-evidence of a truth. Unlike scientific truths, which are always a modifiable approximation of the state of the world, legal truths fix a certain representation of the world and continue to produce their normative effects as long as people continue to believe in them. Their veracity does not depend on fluctuating empirical data but on the trust they are able to elicit, in this case, trust in the accounting image presented by a company regarding its economic situation. If that trust falters, either for good reasons (too wide a gap between the accounting image and reality) or for bad ones (a rumour, stock-market panic), then the company's credit will plummet, as occurred in the Enron scandal.

Double-entry book-keeping has a further crucial characteristic, which is its application of an unbending principle of balance to the represented system of rights and obligations. The term 'balance' comes via the Italian *bilancio* from the Latin *bilanx*, used to designate a pair of scales in which two (*bis*) pans (*lancis*) are in equilibrium. Everything on the *balance sheet* must, precisely, be balanced. The merchant can see at once the state of his company and the entries he can act on to ensure it does not go under. In other words, the books present the company as a *homeostatic whole* whose internal equilibrium must be respected. The company director must react to the numerical information given by the accounts, in order to avoid spiralling imbalances becoming so critical that the company collapses in entropy. Profit and loss, from this perspective, are simply indicators which need to be interpreted in the light of other figures. This is why the pressure from the financial markets to get fixated on 'the bottom line'—the company's net balance—can lead to suicidal strategies, if to increase profits one loses the skills (which themselves are excluded from the company's accounts) which ensured the company's market position in the first place. This is the slippery slope on which 'fabless' companies navigate, in their belief that they will be able to keep on amassing golden eggs while outsourcing the goose which lays them.

II. MANAGING

In the Roman Republic, the population census which was carried out every five years ended on a ritual of purification, the *lustrum*, to mark the

city's rebirth. The two specialist legal experts, or censors, who were entrusted with this task through a non-renewable mandate counted the citizens and the goods they possessed, appointed senators, and supervised public morality. 'Census' and 'censorship' in modern English retain a reference to this dual function, just as 'lustre' denotes a period of time (five years) as well as a literal and metaphorical radiance (the Latin *lūstrāre* means to purify ceremonially, to expiate or redeem). Thomas Berns has shown in a recent book how a long line of early modern jurists sought to have the Roman institution of the *censor* restored, among them Jean Bodin, Lipsius, and Montchrestien, and, on the Protestant side, Althusius.[28] Censors, like judges, were legal officers, but unlike judges, they did not apply the law. Instead, their task resembled what could be called—without fear of anachronism—*public management*, a knowledge-based activity.

The Roman censor's primary function was to provide the sovereign with *knowledge* of human and material resources, and thus to contribute to the country's political economy, dissolving the limit Aristotle had drawn between the *oikos* and the *polis*, and treating state administration on the one hand, and the management of a company or a family on the other in the same terms. The most important knowledge provided by the censors was that of the distribution of wealth within the population, this being, ever since the Middle Ages, construed as a 'mirror of the Prince' in the same way as accounting was a 'mirror of the merchant'. It allowed the monarch to gauge his own importance and that of his kingdom. The metaphor of the mirror was also used to refer to the first codifications of laws; for example, the famous *Sachsenspiegel*, the mirror of the Saxons, a code of laws in Middle Low German. Whereas the mirror of the laws composed the image of an ideal order for the sovereign and his subjects to contemplate, the mirror held up by the censors was supposed to present the kingdom as it really was. This 'mirror of the prince' became the 'mirror of the nation' a few centuries later, and continues today in the form of ONS in the UK or Eurostat at the European level.

Equipped with this knowledge, the sovereign could act on two fronts. First, he could *correct* over-large disparities in wealth. Political and legal thought at the time was particularly sensitive to the fact that such inequalities were a source of unrest and sedition, and thus a threat to law and order. Francis Bacon spared no one on this point, comparing money to muck that must not be allowed to accumulate if one wants it to fertilise the land and

[28] T Berns, *Gouverner sans gouverner. Une archéologie politique de la statistique* (Paris, PUF, 2009) 163. This book expands an analysis already present in Berns's *Souveraineté, droit et gouvernementalité. Lectures du politique moderne à partir de Bodin* (Brussels, Léo Scheer, 2005) 183ff. On this history, see Jean-Claude Perrot's earlier *Une histoire intellectuelle de l'économie politique* (Paris, EHESS, 1992) 143ff.

not pollute the atmosphere.[29] Secondly, the sovereign's knowledge was to allow the deserving poor to be *distinguished* from those whom Montchrétien called 'importunate beggars'[30] and, more generally enable 'banishment of the vagabonds, the idle, the thieves, the tricksters and the ruffians',[31] in Bodin's words. To banish is also to make public—one publishes marriage banns—a publicity which in this case is both a punishment and a way of making society transparent to itself. In Bodin's time, only individuals were targeted, but today whole nations are demoted by rating agencies and made to toe the line by the IMF or the European troika. And information technology helps realise the vision of a society laid bare for its leaders to observe, in a way Bodin and the Chinese Legalists could not have hoped for in their wildest dreams. But might this transparency, Bodin nonetheless asked, lead to tyranny? Certainly not, he replied, and for at least two reasons: the honest citizen has nothing to hide;[32] and besides, this transparency does not constrain people from the outside, as would a sentence handed down by a judge, but from within, by encouraging everyone to behave well. Unlike Justice, who is armed with a sword but who is also blindfold so as not to see particularities, the budding discipline of statistics has no power to coerce, but it wants to see absolutely everything.[33]

So once again we come upon the figure of the government of souls, dear to both the Pope and the *Tennô* of imperial Japan. The population censuses in the Bible likewise have a religious dimension, and are to be performed only under God's instructions, and within the limits He poses.[34] God alone keeps the register of souls, and King David even regrets that he complied with God's order[35]—but maybe it was Satan's[36]—to conduct a census of the populations of Israel and Juda. The institution of the *censor*, in encouraging spontaneous compliance with the rules of a society which had been made self-transparent, contains in embryonic form all the ingredients of participatory management. The only elements lacking were the 'objective' images which today statistics and indicators, after two centuries' development, can provide of everyone's activities.

Since the census's primary function was to assess the wealth of the kingdom, it is hardly surprising that the legislative field in which statistics developed most spectacularly was taxation. As the historian Jean-Claude Perrot

[29] F Bacon 'Of Seditions and Troubles' in *The Essays or Counsels, Civil and Moral* [3rd ed, 1625].
[30] A de Montchrétien, *Traité d'économie politique* [1615] (Genève, Droz, 1999) 237.
[31] J Bodin, *Six Books Of The Commonwealth*, tr MJ Tooley (Oxford, Blackwell, 1955), VI, 1 (quoted by T Berns, *Souveraineté, droit et gouvernementalité* (n 28) 194).
[32] Bodin, ibid.
[33] *cf* Berns, *Gouverner sans gouverner* (n 28) 134–35.
[34] *Numbers*, I, 49.
[35] *The Book of Samuel*, II, 24:10.
[36] *Chronicles*, Book One, 21:1–17.

has remarked, 'the overlap of the census and taxation was for many years the best and the worst motivations for book-keeping'.[37] The example he takes is from the early eighteenth century, and Vauban's research into the possibility of introducing a royal levy. To assess the potential yield of this policy, Vauban used two different methods. He isolated a 'proportional mean' of several measurements of the same object (for example, the surface area of the kingdom), and he calculated a 'mean value' arrived at by aggregating heterogeneous data into 'a sort of whole'.[38] For example, he calculated average agricultural yields using data from different parishes or years. Whereas quantities had previously been estimated purely pragmatically (with the idea of 'grosso modo', 'taking the good years and the bad', 'all things told'), taxation gave rise to new techniques of quantification, and new entities such as 'sorts of wholes,' which then became operative categories in law.

The normative force of these new categories increased considerably when the state acquired powerful tools for carrying out censuses, and for calculating and comparing quantified data on the country's population. The two types of mean identified by Vauban—an objective average, calculated from many imperfect observations of the same object, and a subjective average, derived from the aggregation of heterogeneous objects—could then be combined. Adolphe Quételet who, despite his profession as an astronomer, is regarded as one of the founding fathers of statistics and sociology, used these methods. When the exhaustive data he had gathered on the number of births, deaths, marriages, crimes, etc, was plotted on a graph, there appeared regularities which, for example for statistics of fertility, had the form of a bell (the 'Gaussian function'): the pinnacle of the bell corresponded to the age of greatest fertility. One hundred years earlier, Johann Peter Süßmilch, a Prussian pastor and almoner in the army of Frederick II, had seen in this type of regularity the expression of a 'divine order', which he described as follows:

> The most wise Creator and Governor of the world brings forth from the nothingness the hosts of humans by creating those He has commanded to live. The Lord has us all pass in the same way before his eyes, until such a time as each of us, having attained the goal decreed, deserts the world's stage. Our emergence, our passage before the Lord of Hosts, and our departure all occur in admirable order. Our appearance in the land of the living occurs progressively, without precipitation and according to certain numbers, which are always in a precise relation to the army of the living and the numbers of the departing. Just before we enter the land of the living, some of us are struck off the tally, these are the stillborn. But even this operation occurs in accordance with fixed proportions. Two facts are

[37] Perrot, Une histoire intellectuelle de l'économie politique (n 28) 147.
[38] ibid, 28–29.

> particularly worthy of our attention concerning our emergence from the void: 20 girls are always born for 21 boys, and the newly born are always a little more numerous than those who return to dust. This is how the human army continues to increase slightly, but always in a set proportion.[39]

Like all nineteenth-century scientists, Quételet abandoned the idea of a divine order, and used the numerical regularities discovered to construct the image of the 'average man' whose role in statistics is the same as that of 'the normally prudent and diligent man', or the 'reasonable person' in issues of civil liability, that is, a standard of normality by which the deviations of individual cases may be measured. Quételet called the regular effects revealed by numbers 'binomial law', but Pearson later renamed it 'normal law' ['*loi normale*'].[40] This shift signalled the emergence of a *normality* induced from the observation of facts, which displaced the *legality* of the legal system, and hence replaced the subject of law with an object of care, through the institution of what Foucault has called 'biopolitics'.[41]

The 'objective laws' brought to light by quantification inevitably had an impact on law. They were based on the supposition of constant causes which could explain the observed regularities. The inductive method used did not measure the effects of an identifiable cause, but inferred from the unchanging nature of certain measurements that constant causes existed. In biology, this idea of explaining phenomena through quantification was extraordinarily successful because it held out the promise of discovering laws which would be as rigorous and unquestionable as the laws of physics. Since legal systems attach normative effects to the laws of science,[42] they could certainly not ignore these 'normal laws', all the more so as Quételet and his successors did not restrict their quantifications to physical features alone, but also calculated what was called 'moral behaviour', and today would be called socio-cultural phenomena such as marriage, suicide or homicide. It becomes clear that no simple limit can be drawn between physical and socio-economic features. Studying the statistics of mortality, for example, shows differentials linked to wealth or working conditions, such that one must impute social causes to physical effects. Research of this kind, as carried out, for example, by the doctor Louis René Villermé in the first half of the nineteenth century, encouraged the

[39] JP Süßmilch, *Die göttliche Ordnung in den Veränderungen des menschlichen Geschlechts aus der Geburt, dem Tode und der Fortpflanzung desselben*, 2 Teile [1st ed 1741, 2nd ed 1761–1762], vol II, ch I, §14, 468. On these origins, see also H Le Bras, *Naissance de la mortalité. L'origine politique de la statistique et de la démographie* (Paris, Gallimard-Le Seuil, 2000).

[40] In 1897. *cf* TM Porter, *The Rise of Statistical Thinking* (Princeton, Princeton University Press, 1986).

[41] *cf* M Foucault, 'Society must be defended', *Lectures at the* Collège de France, *1975–1976*, tr D Macey (New York City, Picador, 2003).

[42] This point is developed in A Supiot, 'L'autorité de la science. Vérité scientifique et vérité légale' in P Rosanvallon (ed), *Science et Démocratie. Colloque de rentrée du Collège de France* (Paris, Odile Jacob, 2014) 81–109.

adoption of the first social laws, which were introduced to tackle the relative over-representation of death and disease among the working class.[43] The statistical measurement of the specific physical risks run by certain categories of the population was thus pivotal in the birth of social legislation, which was the first area to respond to the social differences revealed by quantification.

The use of the term 'social' here, to qualify a new branch of law, implied a new legal representation of society. 'Society', as conceived in the French 1789 Declaration, was an ideal homogeneous body composed of free and equal persons (even if this ideal was already compromised by the exclusion of women from universal suffrage and, later, when voting was linked to a tax threshold, the exclusion of the poor). The only political arithmetic to have legal validity was therefore elections—one person, one vote: in Tocqueville's words, 'the notion of government has been simplified. Numbers alone make laws and the law. Politics has been reduced to a question of arithmetic'.[44] The 'society' sketched by social law is quite different. It is not a homogeneous political body, but a 'sort of whole', to borrow Vauban's words, composed of heterogenous and also dysfunctional elements, as revealed by statistical studies and the new discipline of sociology. This 'whole' cannot survive without legal measures to support the most vulnerable, above all working-class women and children. This is why the jurist Louis Josserand gave the name of *class law* to what was otherwise known as 'workers' law' or 'industrial legislation',[45] implying that the physical and spiritual hardships of this new class were not regarded as facts of nature, but as the consequences of the industrial revolution. Social legislation was thus built on the conviction that material inequalities such as illness, accidents, or life expectancy, but also inequalities in ways of life, had socio-economic causes.

At the same time, but inversely, socio-biology and racial biology attributed physical causes to social phenomena. This was the direction taken by Francis Galton (1822–1911), a cousin and admirer of Darwin, and one of the inventors of biometrics and eugenics, who sought to relate the distribution of physical, intellectual and spiritual qualities revealed by statistics to natural selection. He advocated eugenicist legislation, to improve the human species by encouraging the reproduction of the fittest and the most capable, and the progressive elimination (through sterilisation) of those whom the 'normal law' categorised as deviants.[46] Nazi Germany was certainly not the only country to pass laws designed to eliminate the 'unfit'; this occurred

[43] L-R Villermé, *Tableau de l'état physique et moral des ouvriers employés dans les manufactures de coton, de laine et de soie* (Paris, Renouard, 1840); rpt, *Éditions d'histoire sociale* (1979), 2 vols, 458 and 451.

[44] de Tocqueville, *The Old Regime and the Revolution*, Vol II (n 1).

[45] L Josserand, 'Sur la reconstitution d'un droit de classe' (Dalloz, Recueil hebdomadaire, 1937) 1–4.

[46] *cf* A Pichot, *La Société pure. De Darwin à Hitler* (Paris, Flammarion, 2000); and, by the same author, *Aux origines des théories raciales. De la Bible à Darwin* (Paris, Flammarion, 2008).

in the United States and in almost all the Protestant countries of Northern Europe, with the remarkable exception of the United Kingdom. Many progressive thinkers viewed the successful opposition to these laws mounted in the Catholic countries of Southern Europe as a sign of a reactionary attitude going against the movement of history. In some Western countries this eugenicist and racial legislation remained in place long after the end of the Second World War. In the US, racial laws were abolished only in 1964, and the eugenicist legislation in Sweden remained in force until 1976. An estimated 63,000 mentally ill and 'socially maladjusted' people (90% of whom were women) were sterilised against their will in application of these eugenicist laws in Sweden as from 1934.[47]

Both these ways of articulating physical and socio-economic data, as revealed by statistics, supposed that society was a whole, a social body, whose laws of functioning can be elucidated by quantification, and whose malfunctions can be corrected through legal measures. The social sciences, beyond their diversity and their divisions, all defined themselves in relation to this new object called 'Society' with a capital S, a totality which could be contemplated from the outside using the same methods of quantification as the natural sciences. The social sciences also sought to found a legal order on the 'normal laws' which Society had been shown scientifically to obey. Legal qualification and statistical qualification were thus interwoven, since the law was grounded in 'truths' revealed by the quantification of economic and social facts. 'Qualification', in both cases, means relating facts to categories of thought, but there are important differences between this operation in law and in statistics.

All judicial decisions are based on prior operations of *legal qualification*. The judge who is called upon to decide, for example, whether the suicide of an employee in his home can be qualified as a work accident has to examine—and possibly broaden—the notion of 'industrial accident'. This is what the French Cour de cassation did when it ruled that 'an accident occurring at a moment when the employee is no longer in subordination to the employer constitutes a work accident if the employee proves that it occurred due to the work'.[48] The fact that the employer did not take the necessary steps to ensure that the working relationship responsible for the suicide did not deteriorate was qualified in the same decision as 'gross negligence', with the result that the widow and orphans gained rights to 'full redress'. The judge decides on the qualifications—here, 'work accident', 'gross negligence'—only after hearing an adversarial debate between the two parties [*audi alteram partem*]. This debate can be re-opened on appeal or in the Supreme Court. Only at the end of this process will a legal truth be fixed, as

[47] *cf* A Drouard, 'À propos de l'eugénisme scandinave. Bilan des recherches et travaux récents' (1998) *Population*, 53, 3, 633–42.

[48] Civ 2, 22 February 2007, No 05-13771, Bull civ (Bulletin des arrêts de la Cour de cassation: Chambres civiles) II, No 54.

case law. And even then, this truth can be challenged if a judge goes against precedent or if Parliament intervenes. In other words, legal qualification operates in the reflexive medium of language, and thus remains indefinitely open to reinterpretation.

Statistical qualification is less easy to grasp because it works behind the scenes and does not follow procedural rules in the way legal qualification does. Despite this, qualification is a necessary stage in the production of a statistical image of social facts because *one cannot quantify what has not been qualified*. Statisticians talk of 'conventions of equivalence' to refer to the aggregation of heterogeneous elements into a single whole.[49] This procedure is necessary because every enumeration must begin by defining *what* is being counted. To count apples, I must begin by distinguishing them from pears and plums. And if they are for immediate consumption, I shall have to separate the ripe from the unripe and the rotten apples. Since, not unlike us humans, apples do not change overnight from immaturity to maturity, and on to the disorders of old age, I shall have to decide like a judge how to qualify each of my apples in order to single out the edible ones. If I am an apple-seller, I will be tempted to qualify as edible an apple which a more demanding client would qualify as rotten. In other words, the qualification of the objects of a calculation implies a standard of judgment which is not itself an object of calculation, but which makes the calculation possible.

In some cases, statistics simply adopts pre-existing legal qualifications, as when it counts work accidents or the national population. In other cases, however, it uses its own categories, which may then carry over into law. This is precisely what happened with the category 'unemployed', which was a category invented by labour statisticians in the late nineteenth century.[50] However, the constant is always the construction of equivalences, so that heterogeneous elements may nonetheless be counted. Although these conventions of equivalence may be as hotly debated as any issue in the court room or before parliament, statistical qualification still differs in two essential respects from the work of a judge. Since statistics are supposedly the preserve of technical experts, the decisions are not the object of revisable open debate, and there is no standard procedure by which qualifications may be contested. Secondly, once the element has been qualified, it is used not to judge but to count, to fix the facts of the case in figures not letters. In other words, the pronouncements of statistics lie outside the reflexive medium of language, and this gives them a very particular dogmatic power.

This symbolic power of numbers was reinforced by the use of what are called Arabic numerals, transmitted by the Arab Enlightenment, although actually of Indian origin. Unlike Roman or Greek numerals, which retained

[49] A Derosières, 'Entre réalisme métrologique et conventions d'équivalence: les ambiguïtés de la sociologie quantitative' (2001/2) *Genèses* 43, 112–127.

[50] *cf* R Salais, N Baverez and B Reynaud-Cressent, *L'Invention du chômage*, 1st edn (Paris, PUF, 1986); 2nd edn (PUF, coll 'Quadrige', 1999) 288.

semantic traces of a particular alphabet, Hindu-Arabic numerals had the advantage of being potentially universal (as well as abolishing the distance between writing and calculation). They can be compared to sinogrammes, which are understood by Chinese people even if they speak different languages: they simply have to trace the strokes of the character on a slip of paper or on the palm of their hand. But the person they address still has to be able to read sinogrammes, whereas the hegemony of Hindu-Arabic numerals has universalised the normative force of numbers and realised the Babelian dream of a language shared by all humanity.[51]

III. JUDGING

Another dilemma central to law, which modern methods of quantifying social facts sought to address from the outset, was how to choose rationally when in a situation of uncertainty. Legal procedure deals with this, and if one were to teach only one area of law in all law faculties it should unquestionably be procedure. The aim of every trial is to prevent a conflict from degenerating into fisticuffs. Legal procedure converts conflict into litigation, that is, into a regulated exchange of arguments under the supervision of a third party who will hand down a judgement binding on all parties. The role of the judge is to weigh up the arguments in the scales of justice, establish the truth or falsehood of the facts produced, and take a decision which shall have the force of law.

The role of the judge is similar to that of a gambler, who also takes decisions in situations of uncertainty. Rabelais merged the two in his colourful Judge Bridlegoose, who explains to Pantagruel how he decides on cases by throwing the dice, 'as the custom of the judicatory requires, … and by the rule thereof to direct and regulate our actions and procedures'.[52] Throwing the dice is entrusting oneself to God's judgement, as Saint Augustine observed regarding drawing lots.[53] But ever since Canon law forbade bringing God into settling cases in this way, the search for rational proof took over.[54] Similarly, the experienced gambler does not simply rely on chance, but instead tries to calculate the chances of winning or losing before placing his bets. Pascal's famous wager was directed precisely at this calculating gambler. If he has not received faith through divine grace, then only he can decide

[51] European merchants banned the use of Hindu-Arabic numerals in bookkeeping until the end of the fifteenth century, when its use became standard, long after it had started to be used in mathematics (*cf* Vlaemminck, *Histoires et doctrines de la comptabilité* (n 19) 54).

[52] Rabelais, *Le Tiers Livre*, Édition de Pierre Michel. Préface de Lucien Febvre, (Paris, Gallimard, 1973) Ch 39.

[53] Saint Augustine, *De Doctrina Christiana*, L I, Ch XXVIII, 29, quoted by E Coumet, 'La théorie du hasard est-elle née par hasard?' (1970) *Annales ESC*, 3, 578.

[54] *cf* J-P Lévy, *La Hiérarchie des preuves dans le Droit savant du Moyen Âge depuis la renaissance du droit romain jusqu'à la fin du XVI^e siècle* (Paris, Sirey, 1939) 174; H Lévy-Bruhl, *La Preuve judiciaire. Étude de sociologie juridique* (Paris, Marcel Rivière et Cie, 1964).

whether or not he should believe in the existence of God. Since he has already 'embarked' on life's journey, he cannot escape this question, but his decision will be taken in a situation of uncertainty. Pascal shows that he can decide rationally to believe or not, using the same calculations as at the gaming table. The mathematical rigour of Pascal's demonstration and its sheer daring (basing faith on a calculation) is a precious resource for our understanding of the religious dimension of governance by numbers to this very day. Pascal begins by showing that certainty and uncertainty are not separated by an unbridgeable gulf, but are linked by the 'proportion of the chances'[55] of gain and loss. In the case of the existence of God, the chance is set at a one in two chance. All that remains after this step is to apply the amount of the stakes to this probability: a libertine but finite life on the one hand, and on the other, eternal salvation. The maths holds no secrets, and must lead to *rational belief*, a truth of which 'all men are capable'. One could argue that Pascal does not calculate everything rationally because he decides arbitrarily that there is a 1:2 chance of winning or losing. However, any other proportion would have given much the same result, given that the trump card of infinity has been introduced into the equation. At all events, this is a good example of the impossibility of an entirely self-enclosed calculation divorced from any reference to a value judgement, a qualitative moment underpinning the demonstration. Calculations of probability are at once descriptive and normative.

The problem Pascal was trying to solve in this exploration of probability was in fact a question of law: how should losses and gains be allotted in the case of breach of an aleatory contract?[56] As Alain Desrosières has shown, this question cannot be answered without appealing to an arbiter who stands outside the game and is able to construct 'spaces of equivalence between incompatible, heterogeneous future events which have not yet taken place'.[57] Although calculations of probability can replace the qualitative operations which a judge carries out in order to arrive at a position 'beyond reasonable doubt' (the judge's '*intime conviction*'), and although these calculations can thus replace legal procedure, the figure of the impartial third party does not disappear for all that. In making incommensurable facts commensurable, the third carries out exactly the same type of operations as those undertaken by jurists when they subsume different factual situations under the same legal qualification.

Like the judge, this third must first decide on the truth or falsehood of the facts alleged. In the courtroom, this question is ultimately a matter for 'the prudence of the judge', in the words of Domat, the most brilliant jurist of his time (and friend of Pascal).[58] Prudence, one of the four cardinal Christian

[55] B Pascal, *Les Pensées* in *Oeuvres Complètes* (Paris, Gallimard, 1954), pp 1214–1215.

[56] *cf* E Courmet, 'La théorie du hasard est-elle née par hasard?' in *Annales. Économies, Sociétés, Civilisations,* no. 3, 1970, pp 574–98.

[57] Desrosières, La Politique des grands nombres, (n 2) 65.

[58] J Domat, *Les Loix civiles dans leur ordre naturel* [1689–94] (Paris, M de Héricourt éditeur, 1777) 285.

virtues—the others being justice, fortitude and temperance—is the faculty of discernment thanks to which actions may be guided by an exact representation of the truth. The famous sculptures of the tomb of Francis II of Brittany portray Prudence as a twin-facing figure, representing from the front a young woman holding in her right hand a compass, the symbol of the measure appropriate to every action, and in her left hand, a mirror.[59] Due to this mirror, she does not simply face the future, but also looks into herself, for self-knowledge, and behind her to the past. No prudent action is indeed possible without self-knowledge and the benefits of experience, as this sculpture also shows, on its reverse side, through the depiction of a pensive old man facing away from us and towards the past.

Figure 5.1: The Allegory of Prudence, one of the four cardinal virtues which stand at the corners of the tomb of Francis II, Duke of Brittany, and his wife Marguerite de Foix, sculpted by Michel Colombe, Nantes Cathedral © Florian / WikiCommons

[59] On this tomb, *cf* Fulcanelli, 'Les gardes du corps de François II de Bretagne', in *Les Demeures philosophales et le symbolisme hermétique dans ses rapports avec l'art sacré et l'ésotérisme du grand œuvre*, 3rd edn (Paris, Jean-Jacques Pauvert, 1965) Vol 2, 181–238.

The good judge (whose jurisprudence is authoritative) is thus one who takes into account past experience, through self-examination, who is able to assess the reliability of the evidence presented concerning the alleged facts, and who can anticipate the effects of his decision. A key facilitator of these essentially qualitative evaluations is what in French procedure is called the *principe du contradictoire*, which means that the judge decides only on the basis of evidence which all the parties to the trial have been able to discuss. This is the rule laid down in Article 427 of the French Code of Criminal Procedure: 'The judge may only base his decision on evidence which was submitted in the course of the hearing and adversarially discussed before him'. The value attributed to a piece of evidence presented to the judge will depend on several factors: the conditions surrounding it (a testimony under oath carries greater weight than a simple declaration before a police officer), on the character of the person testifying (the words of an honest citizen are more trustworthy than those of a ruffian) and on the credibility of the facts attested (seeing the Virgin Mary appear is less credible than seeing a shepherdess).

The founding fathers of calculations of probability—Leibniz, Bernoulli, and Condorcet—attempted to quantify these types of factors, in order to give a numerical value to the possible truth of a reported fact. In her *Classical Probability in the Enlightenment*, Lorraine Daston cites many examples of these calculations, as applied in the field of law.[60] Condorcet, in one of his *Mémoires à l'Académie royale des sciences*, arrived at the following formula to calculate the probability of an extraordinary event reported by a witness:[61]

> Let us suppose that u and e represent the probability of the truth of an extraordinary event and of the falsity of the same event, and that at the same time u^1 and e^1 express that the probability of a testimony will or will not conform to the truth, and that a witness has testified to the truth of this event […], the probability that the extraordinary event declared true really did occur will be:
>
> $$\frac{uu^1}{uu^1 + ee^1}$$
>
> and that it is false:
>
> $$\frac{ee^1}{uu^1 + ee^1}$$

Some years later, Laplace arrived at a significantly more complicated formula in his calculations of the probability (P*i*) of the truthfulness of a

[60] Daston, Classical Probability in the Enlightenment (n 2) 306–69.

[61] M-J-A de Condorcet, *Mémoire sur le calcul des probabilités* [1786], in *Arithmétique politique: textes rares ou inédits* (1767–1789), critical edition with commentaries by Bernard Bru and Pierre Crépel (Paris, INED- PUF, 1985) 432.

testimony which claims that a number i was drawn from an urn containing n numbers.[62] There are four possibilities, he maintains: the witness does not lie and is right (P1 = pr/n); the witness does not lie but is wrong (P2 = $p[1 - n]/r$); the witness lies and is not wrong (P3 = $[1 - p][r]/n$); and the witness lies and is wrong (P4 = $[1 - p][1 - r]/n$: L). This gives the following mathematical formula:

$$\mathrm{P}i = \frac{\frac{pr}{n} + \frac{(1-p)(1-r)}{n(n-1)}}{\frac{pr}{n} + \frac{p(1-r)}{n} + \frac{(1-p)r}{n} + \frac{(1-p)(1-r)}{n}}$$

or:

$$\mathrm{P}i = pr + \frac{(1-p)(1-r)}{n-1}$$

Formulas of this sort already give substance to the dream of replacing the judge, who decides impartially on the truth of an alleged fact, with a calculating machine.[63] They prefigure the role of computers in regulating the financial markets through governance by numbers. Calculations of probability also embody a change in the hierarchy of values by privileging considerations of utility over knowledge in the face of uncertainty. Pascal's wager already demonstrates this inversion, insofar as his libertine has no interest in fathoming the mysteries of existence, all he wants is to maximise his winnings. Through calculation, he can evade both the abyss of a world devoid of sense, and the absoluteness of a world over-saturated with sense. Thus purged of any metaphysical qualms, he can live his life in the dimension of the gambling table, which knows neither heights nor depths. This shift in values separates Greek investigations—centred on the contemplation of the world—from our own, which have to prove their usefulness. Usefulness is indeed what gave statistics its momentum: society is constructed as an object of knowledge only in order to make it easier to manage. René Thom has argued that at the turn of the eighteenth and nineteenth centuries, the mathematics of control supplanted the mathematics of intelligibility, due to the professionalisation of the activity of the scholar or scientist: 'Armed with the certainties of science, the enlightened man gradually transformed into what today we would call a technocrat'.[64]

[62] P-S de Laplace, *Théorie analytique des probabilités* [1812], 3rd edn (Paris, Coursier, 1820) 457, quoted by Daston, *Classical Probability in the Enlightenment* (n 2) 335ff.

[63] Laplace even applied calculations of probability to judges' decisions in court, in *Essai philosophique sur les probabilités*, 5th edn [1825], preface by René Thom (Paris, Christian Bourgois, 1986) 136–42.

[64] Thom, Preface to Laplace, *Essai philosophique sur les probabilités* (n 2) 6–7.

IV. LEGISLATING

The first calculations of probability bear this tendency out, in that they did not confine themselves to establishing certains facts, but additionally sought to formulate the rules governing these facts. Calculations of probability thus overstepped the limits of stating what *is*, and concerned themselves with what *should be*. They did not simply describe, they prescribed.

The legitimacy of probability calculations as a basis for a legal decisions was first debated in the context of a public health issue: the question of whether inoculation against smallpox should be made obligatory, as a preventive measure.[65] It was clear that this would reduce the incidence of the illness as a whole, but the inoculation had also caused the death of a number of people vaccinated. On the basis of the patchy statistics existing at the time, the risk was evaluated at 1/300. When Daniel Bernouilli presented a paper to the Academy of Sciences on the subject in 1760, he recommended applying a formula similar to the one used for calculating one's chances of winning at the lottery. Since the results gave an increased life expectancy of about three years for those inoculated, he implicitly recommended inoculation for everyone. The case was hotly debated. Bernouilli's argument for inoculation was echoed by most of the enlightened minds of the time, especially Voltaire, and the issue was framed as a conflict between the forces of progress and of reaction, where progress meant adapting the government of men to the facts of science.[66] Among the *philosophes*, only d'Alembert came out against, arguing that one could not apply to a problem where human lives were at stake a calculation based on incomplete data.[67]

Since then, the questions raised by this famous controversy have not gone away. Public health policy is still obliged to take into account the two facets of illness, as a quantifiable social fact and as a singular event in a person's private life. In the nineteenth century, hygenicist doctors advocating a 'numerical method' which standardised care on the basis of medical statistics fought it out with doctors who set store by clinical experience and individualised discussion with the patient. Claude Bernard, who was critical of the numerical method, accused it of treating conditions 'on average,' instead of using in-depth knowledge of the particular determinations of the illness.[68] The fact that the primary factors of illness appeared to be physical

[65] On this debate, see Laplace (n 63 above) 145ff; J-P Benzécri, *L'Analyse des données* (Paris, Dunod, 1973); Daston, *Classical Probability in the Enlightenment* (n 2) 83ff; Le Bras, *Naissance de la mortalité* (n 3).

[66] A Rowbotham, 'The Philosophes and the propaganda for inoculation of smallpox in eitheenth-century France' (1935) *University of California Publications in Modern Philology*, 18, 265–90; AA Rusnock, *Quantifying Health and Population in Eigteenth-Century England and France* (Cambridge, Cambridge University Press, 2002) 249 esp 43–91.

[67] *cf* Daston, *Classical Probability in the Enlightenment* (n 2) 84ff.

[68] *cf* Desrosières, *La Politique des grands nombres* (n 2) 104ff.

doubtless helped justify the use of calculations of probability to decide on preventive or other treatments, since it seemed legitimate to accept statistical regularities which derived from the unchanging and universal laws of the physical world. This is why the first applications of probability calculations to legal issues all concerned physical phenomena, particularly mortality, which the development of statistics could represent in the form of quantified tables. The 'Galilean sciences', which are also based on measuring regularities observed in nature, are not so different. Techniques such as life insurance and life annuities, which were still assimilated to games of chance in the seventeenth century—and particularly blameworthy ones at that, because they played with an individual's life—tended to be considered, by the nineteenth century, as a sign of forethought, which the authorities would do well to foster in the venerable minds of the *pater familias*.

The legitimation of probability calculations started with a Gambling Act in the UK, passed in 1774, which made the interests of the person insured into the criterion by which to distinguish between insurance (legitimate) and a bet (legally void).[69] John Law, and the crash of his system insuring lottery losses, was fresh in people's minds. And in order to decide whether the insurance contract was 'in the interests of the person insured', the question posed was: does it imply the long time of foresight, or the short time of speculation? This same question could helpfully be applied today, if only there existed some genuine determination to regulate the financial markets. For everything points to the fact that insurance on the financial markets has become speculative in the way that led to its being banned until the eighteenth century. The lifting of this ban—a change which enabled the construction of the modern Social State—was not unconditional. The generalisation of social statistics seemed to transform uncertain events into calculable risks, but these calculations were still screened by a principle of prudence. This principle cannot itself be an object of calculation because it applies to the essential function of insurance and not just the extent of particular financial reserves. In other words, the principle of prudence should oblige one to set solvency ratios[70] and limit the activities of insurance to exclude speculative operations.

The importance of insurance in the construction of the social state is unquestionable, but its precise role merits closer analysis. François Ewald, in his book on the birth of the welfare state, examines the debates which led to the inclusion of insurable risk within legal liability.[71] This marked a legal turning-point, the beginning, he argues, of a society which had become

[69] *cf* Daston, Classical Probability in the Enlightenment (n 2) 175ff.

[70] This was the main lesson drawn by European law from the financial crash of 2008. See the 'Solvency II' Directive 2009/138/EC of 25 November 2009, on access to the business of Insurance and Reinsurance, and their practice.

[71] Ewald, *L'État providence*, (ch 4 n 31) 143ff.

totally objectifiable and transparent to itself, regulated by norms rather than governed by law. He calls it a 'society of insurance techniques' [*une société assurantielle*]. This reading leads him to deny any essential difference between social insurance and private insurance. There is no good reason, he argues, to oppose them 'because both use the same techniques of risk, and both proceed by pooling and sharing out the burden of these risks'. Thus one could say that within the vast field of 'social' security, that is, of security which is mutualised through insurance, what we usually call 'Social Security' is but one part.[72] The concept of a society of insurance techniques thus leads to the conclusion that social insurance and private insurance are functionally equivalent. Both types 'pool' risks and use the same actuarial techniques, such that private insurance would be perfectly capable of covering those risks today covered by social security. From there, it is a small step to maintaining that the choice between the two should depend ultimately on their relative cost, set by the market. This step was taken recently by the Court of Justice of the European Union, when it stated, in a decision of 15 July 2010, that 'preservation of [those] elements of solidarity is not inherently irreconcilable with the application of a procurement procedure' since 'the pooling of risks, upon which any insurance activity is based […] can be ensured by a body or [a] undertaking'.[73] The case involved the requirement that the social partners turn to the insurance market for the management of a pension fund established by a collective agreement. A draft European directive of 2012 on public procurement similarly included this requirement, regarding 'obligatory social security'. The political uproar this caused obliged the Commission to withdraw the provision.[74]

The notion of a society of insurance techniques cannot, however, do justice to the scope and complexity of the legal changes brought about by the quantification of social facts. As regards the scope: insurance is only one aspect of the shift from faith in persons, operative at the very heart of institutions, to faith in numbers.[75] It is a shift clearly visible today in insurance contracts, for which statistical risk assessments have progressively supplanted prudent examination of the situation of each candidate.[76] But already in the nineteenth century this movement was emerging in fields as diverse as medical practice and public administration. Quantifying social facts lends them an appearance of objectivity, and makes them commensurable on the scale of the planet. Belief in numbers can thus foster the hope

[72] *ibid*, 390.

[73] Court of Justice of the European Union (Grand Chamber), 15 July 2010, *Commission v/ Federal Republic of Germany*, Case C-271/08, *Droit social* 2010, 1233, observations Francis Kessler.

[74] *cf* Written Question No 02501 by Mme Marie-Noëlle Lienemann (Sénat, *Journal officiel*, 18 October 2012, 2262).

[75] *cf* Porter, Trust in Numbers (n 2).

[76] *cf* Daston, Classical Probability in the Enlightenment (n 2) 182ff.

that another type of rule of law may exist, founded not on dogma but on observed regularities valid for all humankind.

Advances in quantification thus went hand in hand with the idea of a uniform and universal law, such as Condorcet had advocated, in his sharp criticism of Montesquieu's legal relativism. His model for this law was that of weights and measures, a model 'which can only displease men of law who fear to see the number of trials diminish'. He justifies his ideas as follows:

> Since truth, reason, justice, the rights of men, and the interests of property, liberty and safety are the same everywhere, there is no good reason why all the provinces of a State, or even all States, should not have the same criminal laws, the same civil laws, the same laws on trade, etc. A good law should be good for all men, just as a true proposition is true for all. Where in different countries the laws would appear to need to be different, or have objects which should not be ruled by laws, like most of the rules of trade, or are based on prejudices and customs which should be eradicated; one of the best ways of destroying these is to cease to support them through laws.[77]

Condorcet goes on to say that Montesquieu is wrong to evoke the legal function of Tartar or Chinese ceremonies because just as mathematicians accustomed to calculations of probability are capable of explaining the rules of a particular game, so it should be possible to calculate the rules applicable to *all* humanity.[78] The vision of law sketched here prefigures the situation under globalisation: the deregulation of trade, and the eradication of regional and national legal cultures in the name of a uniform law. The only element missing is the natural selection of the fittest 'legislative products' through competition between national legal systems.

Applying probability calculations to social facts has, however, always met with opposition. The early eighteenth-century mathematician Pierre de Montmort identified the two reasons why one should beware of these calculations. The first was that human action does not obey the unchanging laws of nature (and one is fooling oneself if one thinks self-interest can be equated with this type of law). The second was the human mind's inability to grasp all the factors determining any given action.[79] In the following century, Comte added scathing criticism of 'the pretension of some geometers to render social investigations positive by subjecting them to a fanciful mathematical theory of chances',[80] in this explicitly targeting Condorcet

[77] Condorcet, 'Observations sur le vingt-neuvième livre de l'Esprit des lois' in ALC Destutt de Tracy, *Commentaire sur l'*Esprit des lois *de Montesquieu* (Liège, Desoert, 1817) 458.

[78] ibid, 461–62.

[79] PR de Montmort, *Essai d'analyse sur les jeux de hazard*, 2nd edn (Paris, Jacques Quillau, 1713) quoted by Daston, (n 2) 317.

[80] A Comte, 'Relation of Sociology to the other departments of positive philosophy' in *The Positive Philosophy*, tr H Martineau, intro F Harrison (London, George Bell and Son, 1896), Vol 2, Ch IV, 223.

and Laplace. He considered that the high degree of abstraction of mathematics disqualified it from being used at all rigorously for the close study of nature.

> Can one possibly imagine a more radically irrational conception than that which takes for its philosophical basis, or its principal method of conclusive explanation, for all the social sciences, a supposed mathematical theory, in which, as is normal for purely mathematical speculations, signs being taken for ideas, we attempt to subject to calculation the necessarily sophistical notion of numerical probability, which amounts to offering our own ignorance as the natural measure of the degree of probability of our various opinions?'[81]

More recently, this criticism was echoed by Karl Polanyi who attacked the 'immature dogmatism [which] stood guard at the gates of moral statistics, through which the reality of society had announced its entrance in the guise of mathematical precision'.[82] Quantification is legitimate in the social sciences only if it is limited to what can be precisely counted, and does not construct simulations which extrapolate general laws from incomplete measurements of sets of heterogeneous facts. Frédéric Le Play, an engineer by training, and his successors, observed this method scrupulously in their minutely detailed surveys of the living conditions of the peasantry and working-class populations in different European countries.[83] Le Play had been struck by the lack of scientific rigour in the existing statistical tables which, he said, 'take into account neither the specific nature of the individuals, nor the particular character of their living environments; the official data thus neglects the principal facts which science must consider in order to reach conclusions which concern individual existences or different social categories'.[84]

This ethno-accounting continues to be practised today by some researchers, despite the overwhelming dominance of standard econometrics. Instead of replacing the real with prefabricated statistical categories, this type of research attempts to understand in all their complexity the systems of values operative in a human group.[85] For instance, instead of projecting an a priori notion of value onto poor populations in the context of quantified anti-poverty programmes, these researchers regard the attribution of value as a social process which must be understood before one can really improve these people's lot.

[81] ibid, 224 [*tr mod*].

[82] K Polanyi, 'The Machine and the Discovery of Society' [1957] lecture: http://kpolanyi.scoolaid.net, 4.

[83] *cf* the excellent biography of Le Play by F Arnault, *Frédéric Le Play. De la métallurgie à la science sociale* (Nancy, Presses universitaires de Nancy, 1993).

[84] F Le Play, *Les Ouvriers européens* (Paris, Imprimerie impériale, 1855) 301.

[85] See, for example, A Cottereau and MM Mazok, *Une famille andalouse. Ethnocomptabilité d'une économie invisible* (Paris, Bouchêne, 2012).