There is only a constituting movement
Marx and Engels as pioneers in the study of complex adaptive systems

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Introduction
This paper addresses aspects of Marx and Engels’ thought with implications for their political economy which have not, to our knowledge, previously been worked through, or even consistently documented. The topic in question is the fundamental role of the idea of chance, which can be shown to have led not only to an advanced, albeit intuitive, statistical appreciation of crucial issues in Capital, but an understanding of the emergence of laws of political economy and of society that is both antecedent to and richer than the conservative ‘law of unintended consequences’.

The structure of the paper is as follows: first we examine Marx’s discussion of chance and necessity in his doctoral dissertation, the probabilistic conception of economic laws exhibited in his early writings, and his application of this in Capital; secondly we show that Marx was familiar with the subject matter of 19th century controversy over the interpretation of social regularities; thirdly we consider Engels’ attitudes to free will (agency) and determinism.

Marx on chance and statistics

Doctoral dissertation
Marx’s doctoral thesis was written explicitly to defend free-will against determinism (McLellan 1980: 59; McCarthy; Gabaud). He compares the atomist physics of Democritus and Epicurus and defends the latter’s doctrine of the declination, or ‘swerve’, of the atom against other commentators precisely because this theory is designed to permit free-will. He approvingly quotes Epicurus:

‘Necessity … does not exist, but some things are accidental, others depend on our arbitrary will. … It would be better to follow the myth about the gods than to be a slave to the heimarinene [what has been decreed, destiny] of the physicists.’

The declination of the atom is derived dialectically from its concept. For Democritus, the natural motion of the atoms is straight downwards, but Marx agrees with Lucretius that, if so, it is hard to see how nature produces any further determinations, since none of the atoms will interact: ‘[I]f the atoms were not to decline, neither their repulsion nor their meeting would have taken place, and the world would never have been created’ (Marx 1975: 52).
Early economic writing

Marx's approach to political economy is not only statistical but probabilistic in character from his first engagement with the subject; in his notes on Mill (written in the first half of 1844) he discusses the relation between prices of production and values in intrinsically probabilistic terms: 'supply and demand only ever coincide momentarily thanks to a previous fluctuation … This is the real movement … laws in economics are determined by their opposite, lawlessness. The true law of economics is chance' (emphasis in original).

He repeats this in *Wage labour and capital* – originally written as a lecture to the German Workingmen's Club in Brussels in 1847 – and in *The poverty of philosophy* (chapter 1, section 2), written in the winter of 1846-47 against Proudhon: 'it is the fluctuating movement alone that in a society founded on individual exchanges makes labour the measure of value. There is no ready-made constituted 'proportional relation', but only a constituting movement.' (emphases added)

Capital

Volume I: social labour

In the first footnote to chapter 13 of *Capital* Volume 1 Marx cites Quetelet and Edmund Burke in support of his concept of social labour. Burke’s attention is focussed on the total labour performed, not the average per worker. Despite frequent references by Marx to the average labour (per worker) it seems clear from the main text that his real focus is also on the total labour and its value product.

For Marx, and the capitalist, the expected (value) product of the working day is that of the total labour of the workers employed, a random variable found by summing the random variables representing the individual product of each worker’s labour, which is social only in so far as it is employed by capitalists employing other social labours. Hence (in modern language) the total product is the sum of independent identically-distributed random variables.

Marx saw simultaneous employment of many workers as essential for capital to leap over the limit of the working day, which it could do ‘only by positing another working day alongside the first at the same time – by the spatial addition of more simultaneous working days’ (Grundrisse, page 400; see also Rosdolsky, 1977: 247). In *Capital* Marx notes that while a capitalist employing 12 workers for 12 hours a day may thus count on appropriating 144 hours of social labour it is 'a matter of chance' whether a small master employing two workers can appropriate 24 hours of social labour.

Thus the degree to which the actual total labour is equal to its expected value (average social labour multiplied by the number of workers) depends on the number of workers employed. Again in modern language, this is to say that the random variable describing individual labour is in the domain of attraction of the random variable describing social labour; it can be shown (by a generalisation of the central limit theorem) that the only distributions to have such a domain of attraction are members of the stable family.

Volume III: profit-rate ‘equalisation’

In Volume III of *Capital* Marx claims that ‘prices of production’ serve to bring about equalisation of profit rates which would otherwise be unequal – according to Marx's theory of value – because of varying proportions in the labour and capital employed and hence in the surplus value captured by a given total capital advanced.

The prices of production are not market prices; the latter vary with fluctuations in supply and demand, with production prices being an average of market prices: ‘The same domination of the regulating averages will be found here that Quetelet pointed out in the case of social phenomena.’ (Marx, 1980: 1000)

Marx's claim that the rate of profit is the same in all spheres of production 'because it is adjusted to that of [the] average spheres, where the average composition of capital prevails' is well-known. Less frequently noted is that he immediately adds: 'Between those spheres that approximate more or less to the social average, there is again a tendency to equalization, which seeks the 'ideal' mean position, i.e. a mean position which does not exist in reality. In other words, it tends to shape itself around this ideal as a norm.' Marx (1981: 273, emphases added).
Even among the (approximately) average spheres there is only a tendency to equalisation, a tendency ‘to shape itself around this ideal [mean] as a norm’ (our emphasis). In other words, profit rate equalisation is the formation of a profit-rate distribution (‘shape itself around’ the mean). This might be thought a fanciful interpretation, were it not that a few pages later (Marx 1981: 283–4) Marx not only describes a probability density, but also discusses how variations in its shape – symmetric or not, light- or heavy-tailed – will affect the relation of the mean to the whole; he even considers the effect of censoring some of the data.

If we are right in interpreting Marx as having in mind something corresponding to the modern notion of the probability density function then he would seem to be some way ahead of Quetelet, who considered explicitly only ranges and averages1 (Mosselmans 2005), and indeed of Galton. Not only is Galton’s interest in deviations from the average clearly also present in Marx, but the latter’s discussion of skewed and heavy-tailed distributions is ahead of Galton, who dubbed the Gaussian distribution ‘normal’ (Hacking 1990: 184).

Social statistics in the early 19th century

Society prepares the crimes

The discovery in the early 19th century of regularities in social phenomena such as suicide, murder, marriage and burglary caused a crisis. The determinism inherent in what Engels called ‘French materialism’ suggested that these regularities must be a sign that forces as irresistible as those that kept the planets in their orbits must govern social affairs – a doctrine referred to as statistical fatalism: ‘society … prepares the crime: the guilty person is only the instrument who executes it’, as Quetelet wrote enthusiastically to his friend Villermé (Quetelet 1832). But in his published *Treatise* he is more cautious:

Society includes within itself the germs of all the crimes committed…. It is the social state, *in some measure*, which prepares these crimes…. Every social state supposes, then, a certain number and a certain order of crimes, these being merely the necessary consequences of its organisation.

*Treatise*, page 6, emphasis added

Note: ‘in some measure’. Quetelet is well aware that, in the climate of the time, even a tentative suggestion that human society obeys laws as inexorable as those of nature may bring accusations of fatalism and materialism. ‘It may … be asked,’ he adds, ‘what becomes of human free-will and agency?’ His response to this is ingenious: the accusers also wish to ameliorate society by mending laws and morals – but this itself assumes materialism (Preface to English translation of the *Treatise*, page vii).

Marx on free will and suicide

Suicide looms large in the debate on statistical fatalism. Hacking devotes two whole chapters to it (chapters 7 and 8), accounting for 17 pages, and his index refers to another seven pages where it is discussed. When Quetelet discusses the development of man’s moral qualities in Chapter Two of Book Three of his *Treatise*, his first concern is ‘Of suicides and duels’ (page 80); only subsequently does he consider the statistics of crime.

No doubt this is because suicide seems at first glance to be the ultimate exercise of free-will – but if the number of these is much the same in every year, then one thinks that there must be some external cause, in the same sense that one supposes there are external causes behind the fact that the rate of death from heart attacks is much the same in every year. Clearly, no one imagines that having a heart attack is a voluntary act.

The phenomenon fascinated the public of the 1840s – so much so that Marx translated and edited a sensational French text on the topic for radical German readers. This was the chapter on suicide in Peuchet’s *Memoirs from the police archives*, published in 1838. Marx’s translation was published in 1846 in the *Gesellschaftsspiegel* (or *Mirror of Society*) (Plaut 1999:11). Since

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1 However, Quetelet’s appeal to the correction of astronomical observations, in his justification of the ‘average man’, certainly implies the Gaussian distribution (Mosselmans 2005).
Marx did not hesitate to not merely edit, but interpolated his own views where they varied from the original, we can infer Marx’s own opinion from the contrast with Peuchet.

The text opens with Peuchet describing ‘the yearly toll of suicides’ as being ‘to some extent normal and periodic’; Marx immediately intervenes, altering Peuchet’s comment that this ‘has to be viewed as a symptom of the fundamental defect of our society’ by substituting ‘deficient organisation of our society’ (page 47); next Peuchet (and hence Marx) notes that although the suicide rate varies with the state of the economy and ‘penury’ is the ‘greatest source’, yet it is found among the idle rich as well as among artists and politicians. The police archivist adds:

Above all, it is absurd to claim that an act, which occurs so often, is an unnatural act.  
... What is contrary to nature does not occur. It lies, on the contrary, *in the nature of our society* to cause so many suicides, while [the Berber and] the tartars do not commit suicide. *Not all societies bring forth the same results.* We must keep this in mind in working to reform our society to allow it to reach a higher level. (pages 47-48, emphases Marx’s; text in square brackets omitted by Marx).

Thus Marx here adopts the same position on the dependence of suicide statistics on the particular organisation of society that we have seen with Quetelet.

**Marx and Quetelet**

We have seen that Marx was familiar with the rise of social statistics in the early nineteenth century, and adopted a fundamentally probabilistic outlook from the start of his work on political economy.

A puzzling feature is that this cannot be linked to any direct engagement with Quetelet.\(^2\) Marx not only lived in Brussels when Quetelet was at the height of his fame but composed during this period *Wage labour and capital*, a key exhibit in our argument. However, the first definite evidence of Marx reading Quetelet is a notebook dating from late 1851 containing excerpts from the *Treatise* (Marx read the English edition of 1842).\(^3\)

For the moment we have to leave this as a puzzle, but its solution would seem to lie in further consideration of his work on Democritus and Epicurus (absent the discovery of some missing notebook).

**Engels on agency and determinism**

**Anti-Queteletismus**

Hacking notes an interesting correlation in the debate over statistical fatalism: those who believed in the beneficial working of the invisible hand in Adam Smith’s regime of ‘perfect liberty’ adhered to statistical fatalism. But in the empire of ‘national economy’, the administrators of Prussia’s statistical bureaucracy deplored *Queteletismus* and insisted on free will (1990: 127ff) – for example, the Leipzig statistician G.F. Knapp:

*Queteletismus [must lead to] nihilistic rejection of the state and its duties, and the release of the individual from all bonds of society … which at present leads, on French soil, to the greatest catastrophe of our time.*

Lecture given 29 April 1871, *i.e.* during the Paris Commune, 18 March–28 May, 1871 (cited Hacking, 1990:125)

An even more interesting illustration of the links between economic and probabilistic doctrines is the case of Adolph Wagner, the last object of Marx’s scorn for vulgar political economists. Wagner’s first incarnation was as a laissez-faire free-trader, in which guise he went out of his way to agree with *Queteletismus* (Hacking 1990: 130). But about 1870 he changed his

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\(^2\) This may explain the paucity of existing published discussion of their connections; exceptions are Davis (1997: 11-17), Evans (2004 [1975]: 103-105), and Horvath (1977). The first two are rather slight; we have not been able to consult Horvath.

\(^3\) The notebook is in the possession of the International Institute for Social History in Amsterdam: see <http://www.iisg.nl/archives/en/files/m/1076604full.php>
mind, became a founder member of the Verein für Sozialpolitik – the Kathedersozialisten – and began attenuating his fatalism.

**Physics and free-will**

Physical scientists did not overlook the problem of giving an account of free will. One attempt was the interest shown in the work of the French mathematicians Saint-Venant and Boussinesq on differential equations with so-called ‘singular solutions’ (equations where, for some point \( a \), taking values less than but arbitrarily close to \( a \) gives solutions wildly different to those resulting from choosing points arbitrarily close to but larger than \( a \)).

Someone of the stature of James Clerk Maxwell believed that this was the physical loop-hole that admitted free-will into a materialist account.\(^4\) Maxwell compared the situation to that of a pointsman on a railway, who does nothing most of the time, but can direct trains onto different tracks at the crucial moment, although he noted that ‘Singular points are by their nature very isolated, and form no appreciable part of the continuous source of existence.’

**‘A Calvinist without God’**

I have not (yet) been able to find any explicit trace of the debate on statistical fatalism in Marx and Engels’ writings. This has not prevented many commentators from crediting both writers with the most rigid determinism. Hacking claims that ‘Marx read the statistics of … Quetelet … with indifference, divining with their aid the underlying laws of society that bind it in a totally nonstatistical necessity.’ (1990:132). By contrast, Hodgson (1991:6) asserts that Engels is a ‘reductionist causal monist’ (one who believes that intention is completely reducible to material relations), but says that it is uncertain whether Marx was a reductionist monist or a dualist.

A possible case for regarding Marx and Engels as determinists might cite Bernstein’s influential interpretation of their work to this effect, and note that having been hand-picked by them to edit the newspaper of the German Social Democratic Party, he had both their *imprimatur* in respect of his own outlook and ample opportunity to familiarise himself with theirs.

Bernstein’s systematic exposition of his views was published in 1899 as *Die Voraussetzungen des Socialismus*; an English translation by Edith C. Harvey was published in 1909 under the title *Evolutionary socialism*, and reprinted in 1961 and 1963. A new English translation by Henry Tudor has been published under the title *The preconditions of socialism*.\(^5\)

In the Anglophone world Bernstein’s critique of Marx and Engels ‘economic determinism’ has usually been read as a complaint against determinism as such, but this is a mistake: on the contrary, Bernstein’s complaint is that Marx and Engels fail to extend a rigorous determinism to the social and political sphere, with the result that – according to Bernstein – they fall prey to Blanquist theories of revolutionary conspiracy (Bernstein, 1993: 38-9).

This misunderstanding is due to the fact that Harvey’s translation omits Chapter Two, ‘Marxism and the Hegelian dialectic’, where Bernstein presents his philosophical critique of Marx and Engels. According to Bernstein ‘materialism … means … the necessity of all historical events and developments. … [including] the formation of ideas and the directions of the will … from any particular point in time all subsequent events are … determined beforehand.’ This is the point of view of Laplace: ‘[T]o an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it … nothing would be uncertain and the future, as the past, would be

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4 Karl Pearson claimed to hold a letter by Maxwell describing the French writers’ work as ‘epoch-making … the great solution to the problem of free will’ (1978: 161, cited by Hacking 1990: 155).

5 In what follows all quotations from Bernstein’s book are from the Tudor translation and are referenced as (Bernstein 1993); references to Tudor’s introduction and critical apparatus are referenced as (Tudor 1993); the names are omitted where there appears to be no danger of ambiguity. Note that Tudor’s translation is of the first edition (1899), not the revised and enlarged second edition (1921).
present to its eyes.’ (Philosophical Essay on Probabilities, pp 3-4, cited Hacking, 1990: 11) Below we will refer to this doctrine as ‘hyper-determinism’.

Bernstein supports his interpretation of historical materialism with a lengthy quotation from the Contribution to the Critique of Political Economy, beginning with the claim that ‘it is not the consciousness of men that determines their existence, but their social existence that determines their consciousness’. Bernstein’s reading is that ‘consciousness’ and ‘existence’ are so sharply opposed that ‘we are nearly driven to conclude that human beings are regarded as nothing but the living agents of historical forces whose work they carry out against their knowledge and will’ (Bernstein, 1993: 14).

One classic survey of marxist thought suggests that many contemporary marxists shared this conception: see Kolakowski, 1978, Vol. II, pages 35, 144, 180, 272, 338, and 454 – in Lafargue’s case (page 144) the extreme version implied by Bernstein; that since all human behaviour is subject to determinism, free will is a delusion.

The only exception Kolakowski finds is Brzozowski (page 219), who explicitly combated determinism and held that ‘[t]here was not a single concept, vision or method which, in the transfer from Marx’s mind to Engels’, did not become completely different, and indeed diametrically opposite as far as the philosophical nature of concepts is concerned’ (cited 224).

Engels on chance and necessity

Bernstein claims that the materialist is necessarily ‘a Calvinist without God’ through commitment to hyper-determinism. In a footnote, Tudor comments that ‘[t]his reads like an unacknowledged quotation from Engels’ but that he cannot find the source. (1993: 13)

If Bernstein is here intending to associate his ideas with Engels’, he is wrong. In the Dialectics of Nature Engels explicitly attributes hyper-determinism to Calvin, but rejects it.

‘[D]eterminism … has passed from French materialism into natural science, and … tries to dispose of chance by denying it altogether. … With this kind of necessity we … do not get away from the theological conception of nature. Whether with Augustine and Calvin we call it the eternal decree of God, or Kismet as the Turks do, or whether we call it necessity, is all pretty much the same for science. There is no question of tracing the chain of causation in any of these cases … the so-called necessity remains an empty phrase, and with it—chance also remains what it was before.’ (Engels, 1940: 231-2)

Engels regarded Calvinism as the ideal doctrine for a rising bourgeois class: ‘fit for the boldest of the bourgeoisie of his time … the religious expression of the fact that in the commercial world success or failure does not depend upon a man’s activity or cleverness, but on … unknown economic powers’ (Engels, 1976: 437).

Bernstein himself quotes this passage in his Cromwell and communism (Bernstein 1980:28-9). Inattentive reading of this passage might see it as support for economic determinism – but Engels is discussing the problems of life in ‘the commercial world’, not the metaphysical status of the economic with respect to a science of history: we shall see below the significance of Engels’ reference to ‘unknown economic powers’.

Engels’ critique of hyper-determinism could be read as equivocation—willing to pour scorn on an ungenial outlook that is vulnerable to criticism, unwilling to admit that that same outlook is apparently required by a consistent materialism—in which case one might sympathise with Bernstein’s association of historical materialism with predestination, especially given Engels’ notorious comment about freedom being the recognition of necessity.

However, this remark, examined in its context, is clearly no more than the point that ignorance of natural laws leaves us at their mercy whereas knowledge of them makes us their master, in the sense that we can—for example—exploit the law of gravity by building a hot air balloon (‘Freedom does not consist in an imaginary freedom from natural laws, but in the knowledge of these laws and in the possibility which is thus given of systematically making them work towards definite ends.’ (Engels, 1976: 144)).

Bernstein was converted to socialism by reading Dühring, and then to marxism by reading the Anti-Dühring (Gay 1952: 24-26). Thus Bernstein’s errors are inexcusable, for the passage
in question is explicitly for the purpose of criticising Dühring’s attack on ‘silly delusions of inner freedom’ (cited by Engels, 1976: 143).

Engels condemns both those who regard a thing as ‘either accidental or necessary, but not both at once’ and ‘the hardly less thoughtless mechanical determinism which by a phrase denies chance in general only to recognise it in practice in each particular case’. While ‘[c]hance overthrows necessity, as conceived hitherto’ the attempt to maintain Laplacean determinism ‘means to deny thereby all inner necessity in living nature, it means generally to proclaim the chaotic kingdom of chance to be the sole law of living nature.’ (1940: 234, emphasis added).

Conclusion
We have seen that Marx saw chance as means of defending free will (in his dissertation) and as the foundation of a scientific political economy (in his early writings), and that he developed this approach in Capital. Yet he also asserted the social determination of such regularities as the suicide rate. Similarly, although Engels explicitly adopted Marx’s probabilistic political economy (in his introduction to the Poverty of philosophy), and defended free will against Dühring, he regarded it as a matter of fact ‘that in the commercial world success or failure does not depend upon a man’s activity or cleverness, but on … unknown economic powers’.

How can this apparent opposition be reconciled? Bernstein unwittingly supplies the answer: to support his claim that historical materialism requires more than merely economic determinism he cites Engels (1993: 15) to the following effect: legal forms, political or religious ideas affect historical conflicts and may even ‘predominate in determining their form … Thus there are … innumerable intersecting forces, an infinite series of parallelograms of force which give rise to one result—the historical event. … For what each individual wills is obstructed by everyone else, and what emerges is something that no one willed’ (emphases in Bernstein).6

Bernstein, with his hostility to dialectics, misinterprets this as support for his own hyper-determinism. But for Marx and Engels the product of human free will (in a commercial society) is precisely mutual constraint and the appearance of social laws as immutable as the laws of nature.

References