

THE OPENNESS PARADIGM

WHO COULD OBJECT to ‘open innovation’? The term, which has migrated from software development to become a staple of business-management strategy, seems to conjure the most desirable aspects of contemporary American capitalism: freedom, creativity, democratic accessibility, the possibility of new frontiers. The ‘openness’ paradigm promises to combine new production systems, made possible by the technologies of Web 2.0 and the shrunken space of globalization, with novel forms of business organization and value extraction; it offers a powerful weapon in inter-firm competition and a new regime of labour. The paradigm has been promoted by a torrent of books and articles from US business schools over the past decade. In 2003 a Google search for ‘open innovation’ brought up 200 results, according to Henry Chesbrough, one of the gurus of the field and Director of the Centre for Open Innovation at Berkeley’s Hass Business School.¹ By 2013, the figure was 672,000,000.

Just as the Fordist organization of production gave way to ‘flexible’ forms in the 1980s, so—its proponents argue—flexibility is now being superseded by the ‘open business model’. Already it is said to have spread from electronics to bio-technology and pharmaceuticals, and is starting to penetrate agribusiness, food processing and the machine-tools sector; a 2013 survey claimed that three quarters of firms in the United States and Europe with sales over \$250 million were practicing ‘open innovation’.² Yet a closer look reveals that, rather than being a strength of American capitalism, the openness paradigm is a symptom of its problems: profit-gouging without sustained investment and squeezing labour to sap already weak, and credit-dependent, demand.

Fordism to flexible production

Classical Fordism entailed vertically integrated firms. These had already started to emerge with the monopolies of the late 19th century. Andrew Carnegie developed the US Steel Corporation by buying up operations at all phases of the value chain: iron-ore fields, coal mines, steel mills, rail roads and barges. John D. Rockefeller built up the Standard Oil Corporation to include not just oil refineries—he owned most of the refining capacity in the United States—but pipelines, oil cars, barrel-making plants, retail stores and factories that produced, among other things, asphalt, fertilizer inputs, lubricating grease, heating oil and gasoline. Similarly, flour milling was dominated by Pillsbury, meat packing by Armor, soap products and household goods by Procter & Gamble. The Fordist principle—Henry Ford paying his auto-plant workers just enough for them to be able to buy a Model T—helped boost domestic demand and provided the rationale for high-volume production, ‘just-in-case’ of demand, with little concern for unsold inventories. With anti-trust legislation the monopolies restructured themselves into oligopolies, but the corporate imperative was still focused on internalizing as many activities as possible within giant firms. Surviving the Great Depression, the paradigm was given an enormous boost by the war-time boom. US corporations grew to be hegemonic in the global economy.

By the 1970s, US firms were struggling in the face of increasing competition from Germany and Japan—and soon from Taiwan, South Korea, China and Vietnam—that left the world market burdened with manufacturing overcapacity. In the midst of recession, oil crises and waves of labour militancy, these problems of overcapacity were exacerbated by the cost of warehousing the resulting surplus inventories. Corporations had already begun to cut production costs by shifting to cheaper, non-unionized labour markets, both in the US South and overseas. But as profitability rates continued to fall, large shareholders demanded more incisive action. Amid rounds of aggressive acquisitions and mergers, cost-cutting and asset-stripping resulted in the vertical

¹ Henry Chesbrough, ‘Everything You Need to Know about Open Innovation’, *Forbes*, 21 March 2011.

² Oliver Gassmann, Ellen Enkel and Henry Chesbrough, ‘The Future of Open Innovation’, *R&D Management*, vol. 30, no. 3, June 2010; Henry Chesbrough and Sabine Brunswicker, *Managing Open Innovation in Large Firms: Survey Report, Executive Survey on Open Innovation*, Berkeley, CA 2013.

disintegration of firms' operations from the 1980s: non-core activities and non-profit-making departments were eliminated, or their functions outsourced to smaller companies, which typically had to compete to offer the cheapest bid, undercutting each other's labour and development costs. Large firms could order inputs from these suppliers on demand, and thereby ease the burden of over-stocked inventories amid increasing competition in an unstable market.

This new regime of 'flexible production' also saw the rise of retailers to the apex of the distribution system, with manufacturers coming to occupy a subordinate tier. The process was exemplified by the changing relationship between the long-established household goods corporation, Procter & Gamble, and the aggressive new discount store, Wal-Mart. Along with food giants Heinz and Kellogg, the Cincinnati soap-maker had been a pioneer of the branded product, transforming generic commodities into company-specific consumer goods—Ivory, Tide, Crest, Pampers—backed by expensive advertising campaigns; the soap opera had been virtually invented as a genre to attract audiences for its radio commercials. With its massive sales force and proven consumer loyalty, P&G could dictate terms to retailers on prices, schedules and display. By the mid-80s, Wal-Mart had perfected its system for laser-scanning product barcodes and beaming the data directly from in-store check-outs to its Arkansas HQ via its private satellite; the company's annual income had reached \$15bn, the same as P&G's.³ In 1987 Sam Walton persuaded P&G to install a direct electronic ordering system, so that a Wal-Mart store computer could automatically order Pampers from a

³ Wal-Mart had risen to market dominance in the late 70s as what would be called 'a platform player', whose innovative use of technology 'can direct the future evolution of their market, making customers and suppliers fit business models to theirs'—the alpha of 'open innovation': Henry Chesbrough, *Open Business Models*, pp. 132–3. Wal-Mart positioned itself as a distributor, rather than a retailer; its core competency was not marketing but logistics. It expanded into new regions by first building a distribution centre, then ringing it with up to 150 stores. A distribution centre could be the size of fifteen football pitches, over a mile long, studded with bays into which trucks and rail cars would disgorge their cargos of barcoded cartons onto conveyor belts, feeding into the 'merge centre', where electronic eyes scanned the barcodes and electronic arms pushed the cartons towards the correct chute, where further conveyor belts would speed them to waiting trucks for delivery to the stores. The distribution-centre model was used by Home Depot, Target, UPS and Fedex, giving them monopoly control over crucial nodes in the global distribution network: Nelson Lichtenstein, *The Retail Revolution: How Wal-Mart Created a Brave New World of Business*, New York 2009, p. 52.

P&G factory when supplies were running low—rendering the P&G sales force redundant at a stroke. By 2005, Wal-Mart’s annual income was five times that of P&G and it could dictate pricing, volume, packaging, delivery schedules and quality to its suppliers.⁴ It could thereby reduce its own inventory costs while producers increasingly found it necessary to shift to the ‘just-in-time’ approaches that had been developed in the 70s by the leading Japanese auto and electronics firms, who could impose seemingly impossible schedules on their dependent subcontractors.⁵

The flexible production model saw the externalization and downgrading of manufacturing across a broad range of sectors. In apparel, for example, having built up their brands, Gap and Nike concentrated on design, marketing and retail outlets; the manufacture of their clothes and shoes was reduced to a subordinate link in the supply chain, contracted out to lower-tier suppliers in East Asia, the Subcontinent or Latin America, while prices, quality and schedule were coordinated from above. Wal-Mart was once again a pioneer, purchasing directly from East Asia: from the early 80s its operatives in Hong Kong and Taipei sought out manufacturers in mainland China to produce goods specified from Arkansas, offering gross profit margins of only 10 per cent, but vast orders by volume. To meet the delivery schedules, the first-tier Chinese firms would immediately subcontract a large proportion of the order to dozens of small producers, creating a ‘new universe’ of sweatshops for which Wal-Mart and its ilk would bear no legal responsibility.⁶

Blue-chip corporations like General Electric and IBM followed the same route. GE stopped manufacturing TVs, radios and electronic goods, and instead franchised the GE brand to Asian makers, who took over R&D, production, marketing and sales—and assumed all the risks—while GE earned a steady royalty.⁷ Financialization offered another source of

⁴ Lichtenstein, *Retail Revolution*, pp. 55–63.

⁵ The Japanese *keiretsu* model is usually described in terms of long-term, trustful relations, but lower-tier suppliers—their workforces often comprised of women, immigrants or elderly men—received very different treatment; see, for example, Michael Smitka, *Competitive Ties: Subcontracting in the Japanese Automotive Industry*, New York 1991.

⁶ Lichtenstein, *Retail Revolution*, pp. 199, 215–7. Wal-Mart then used its mid-80s ‘Buy American’ campaign to try to force domestic manufacturers to compete with East Asian suppliers: pp. 205–9.

⁷ Henry Chesbrough, *Open Business Models: How to Thrive in the New Innovation Landscape*, Boston 2006, p. 100.

income, with higher returns than goods production: by the 90s, GE's financial arm would be responsible for half its earnings. IBM, which had enjoyed a monopoly position in the mainframe-computer market in the 1960s and 70s, plunged into financial crisis by 1992, its profits undercut by Oracle, Intel and Microsoft. CEO Lou Gerstner imposed large-scale lay-offs and the closure of non-profitmaking sections—including the entire R&D department. IBM was refashioned as a service company, licensing its technology to others. Over half its revenue now comes from IBM Global Services, which supports its clients' investments in IT.⁸

Above all, 'flexible production' signalled a downgrading of labour. Wage costs were among the first to be targeted by shareholder agendas; 'functional flexibility' came to mean that a wide range of tasks would be grouped into broad pay categories, thereby eliminating wage rises as employees took on greater responsibilities. 'Numerical flexibility' was another goal, met by the use of short-term and agency labour. Both tended to ensure increased workloads with fewer rewards. Whereas employment was once considered a route out of poverty, the new labour landscape involves people working multiple jobs while still struggling to get by. Wages stagnated—in the US, the real value of the minimum wage fell by 30 per cent in the three decades following 1978—and demand was sustained largely by a huge increase in household debt. Firms targeted the 'haves' and the borrowers of the new global marketplace as potential consumers, ignoring the burgeoning 'have nots'; so-called world cities became, more than ever, sites of both extreme affluence and abject poverty.

'Open innovation'

Yet the profit rates of US firms continued to fall, business cycle by business cycle; the brief high of the late-90s dot.com boom turned out to be a giant bubble that had burst by the summer of 2000. The idea that US firms should respond to intensifying overseas competition by leveraging research and development—'profiting from innovation', in the later coinage of one business school theorist—had surfaced in the 70s, in the face of technological advances by Japanese firms.⁹ One political outcome was the strengthening of US patent protection law and the creation of a dedicated Federal court circuit for patent appeals in 1982. But, beyond

⁸ Chesbrough, *Open Business Models*, p. 196.

⁹ David Teece, 'Profiting from Technological Innovation', *Research Policy* 15, 1986.

decimating R&D departments through staff layoffs, neoliberalism's flexible production regime had not found a solution to the still Fordist character of R&D—indeed, still Taylorist, one might say, given the rigid division that persisted in most big companies between the organization of production and that of 'innovation'. Increasingly fierce global competition and shortened innovation cycles compounded the problem; firms—especially those that still produced goods and services—were under more pressure than ever to increase shareholder value.¹⁰ At the same time, a new demand environment was developing, facilitated by advances in information and communications technologies. Firms lacked the scope of knowledge necessary to cope with increasingly unpredictable customized demand. From the depths of the dot.com recession, however, the idea emerged that the open-source movement, pioneered by the 22-year-old Finnish software developer Linus Torvalds, might provide a model for cheaper—yet perhaps more profitable—R&D.

While working on the code for a new operating system kernel, Linux, in the early 90s, Torvalds had taken to releasing early versions of his work, inviting suggestions from his fellow hackers and constructing the kernel in such a way that it would be simple for others to test, debug and improve. The process, which came to be known as 'open development' or 'open source', proved astoundingly successful. Most strikingly for business theorists, Torvalds estimated that he had only coded 2 per cent of the kernel himself; the rest had been done by online collaborators, for free. The commercial implications were drawn by Eric Raymond in his 1999 best-seller, *The Cathedral and the Bazaar*: technical and market forces, he wrote, were converging to draw open source 'out of its niche role'; the key was 'harnessing open development and decentralized peer review to lower costs and improve software quality.'¹¹ With the advent of 'open innovation' as a business strategy, R&D would be deliberately outsourced, just like the manufacturing of sneakers, to improve the bottom line by exploiting new sources of labour power in novel ways.

The definition of 'open innovation' put little emphasis on ideas as such; what counted was not originality or creativity, but value extraction.

¹⁰ Blandine Laperche, Gilliane Lefebvre, and Denis Langlet, 'Innovation Strategies of Industrial Groups in the Global Crisis: Rationalization and New Paths', *Technological Forecasting and Social Change*, vol. 78, no. 8, October 2011.

¹¹ Eric Raymond, *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*, Sebastopol, CA 1999, p. xi; emphasis added.

Echoing a distinction that goes back to Schumpeter, Chesbrough underscored that ‘by innovation, I meant something quite different from invention. To me, innovation means invention implemented and taken to market.’¹² The twentieth-century paradigm for business R&D had been the internal research laboratory, pioneered by the German chemical industry and naturalized in the US at Western Electric’s Bell Laboratories; the Manhattan Project had operated on the same model. But in an era of intensifying market pressures, firms needed to look outside for innovative concepts, too, while sharpening their tools for profit-extraction. They increasingly found it possible to glean innovative technologies from their suppliers, now furnished with low-cost personal computers and software that facilitated independent innovation. Meanwhile, a new breed of firm emerged to broker the new relations between firms: on the one hand ‘seekers’ with distinct ‘innovation’ problems, and on the other their potential ‘solvers’. These mediators deal not only with expertise and ideas, but also with intellectual property.

In the language of open innovation, intellectual property should be managed like a financial asset. Most saliently, this has involved fierce battles over intellectual-property rights to already existing technologies. The apparently public domain of human knowledge is hardly a cozy commons. The struggle between Apple and Samsung for the smartphone and tablet market is a case in point. Both firms are calling for bans on each other’s products, with claims and counter-claims of patent infringements in US, EU and Asian courts. Samsung argues that its larger screens and cheaper prices are what is attracting market share, not the use of some tiny aspect of touchscreen technology; meanwhile Apple’s lawyer warned a California court that American TV manufacturing had died because US companies had failed to protect their intellectual property from foreign companies: ‘Our economy will disappear’.¹³ When, with Solomonic wisdom, the US International Trade Commission held that each had violated the other’s patents, the Obama Administration unsurprisingly vetoed a ban on Apple products while upholding one on Samsung’s.

¹² Henry Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Boston 2003, p. ix. A product of Yale and Stanford Business School, Chesbrough was a marketing executive for a Fortune 500 disk-drive company in the 80s and ran a business consultancy in Silicon Valley in the 90s, before penning his first work on open innovation during a research stint at Harvard Business School.

¹³ Dominic Rushe, ‘Samsung Ordered to Pay Apple \$290m More for US Patent Infringements’, *Guardian*, 22 November 2013.

The landscape of patent protection is increasingly shaping up as a conflict zone. Once regarded as the domain of lawyers, who were rewarded for keeping their firm out of trouble, patent activity is now a matter for strategic management.¹⁴ It is no protection that the vast majority of patents are never commercialized—an astounding 90 per cent in Procter & Gamble's 2002 estimation—though that fact might suggest that patent activity is a dubious measure of innovation. On the contrary, the combination of a large stock of old inventions that were never put to use and the recent development of 'patent thickets' around bundles of complex, interconnected technologies, has spawned a new industry: patent trolling. The fact that patents are often issued for ideas that are not really new provides particularly fertile ground for patent trolls, who make money by buying up old patents that have some connection to new technologies but had never been commercialized, and then suing big companies for infringement. Patent trolling accounts for around \$83bn a year in lost wealth, and litigation costs increased by 400 per cent in the eight years following 2005 for Google, Blackberry, Earthlink and Red Hat.¹⁵ Companies have started to pay protection money to patent trolls, in the form of high licensing fees to avoid even more expensive litigation.

Where big companies invest in tangible R&D, this is now more likely to be through advancing increasingly internalized corporate venture capital to external firms, on a short-term basis—the Silicon Valley model—rather than expanding their own research departments. The fact that large goods- and services-producing firms have developed their own venture-capital programmes itself speaks to their degree of financialization—in conditions of global overcapacity, higher returns are most often to be found outside their core competencies. A recent survey of the top fifty *Forbes* Global 2000 companies, across five sectors, suggested that only a quarter of them invested corporate venture capital for the purpose of strengthening their core business.¹⁶ The open innovation literature typically avoids mentioning the central role of the state in R&D, despite the

¹⁴ Henry Chesbrough, *Open Business Models*.

¹⁵ Phil Goldberg, 'Stumping Patent Trolls Is the Path to Innovation', *Real Clear Markets*, 30 October 2013.

¹⁶ See Boris Battistini, Fredrik Hacklin and Pius Baschera, 'The state of corporate venturing: Insights from a Global Study', *Research-Technology Management*, vol. 56, no. 1, Jan–Feb 2013. Over half the firms sampled invested in new companies with similar products or services, and the remainder in 'white space'—completely different products or services.

billions of dollars flung at private firms by the Federal government—not least in the field of big data collection and analysis since 9/11, as Edward Snowden has graphically revealed. But it does foreground the importance of penetrating university research institutions: ‘identify academic thought leaders, donate tools and services to assist their research’, for later commercialization.¹⁷

In 2000, Procter & Gamble’s newly appointed CEO, A. G. Lafley, set a goal of acquiring 50 per cent of the company’s innovations from external sources; some 10,000 ideas for products and technologies had been submitted by 2006; firms from its global supply chain were offered the use of a secure IT platform to share technology briefs to ‘co-create’ with P&G. The project was called not R&D but C+D, ‘connect and develop’. Of course, much of what passes for open innovation is little more than corporate PR guff. That certainly applies to General Electric’s glossy *Ecoimagination* brochures, in which the energy giant boasts of the crumbs it has tossed to renewables, calls for new ventures in green fuels and vows to reduce its carbon footprint—eventually—by 1 per cent. The same goes for Procter & Gamble’s online crowdsourcing of a method of printing edible images onto Pringle potato chips. A solution was provided by a baker-cum-science professor in Bologna, who had already found a way to print on cookies and cakes.¹⁸ P&G’s publicity department made much of this quaint story, but the real point was just to gouge another fraction of a cent out of each additive-saturated bite while bypassing the associated costs.

Of greater consequence is the relation of corporate open innovation to its supposed inspiration, open-source software. Many open-source and free software developers have deliberately subverted the idea of intellectual-property rights and, in the process, created a rich commons to which all could contribute, according to their abilities, and from which all could benefit, according to their needs; where innovations could be shared for free. By contrast, a central goal of open innovation is ‘to create a business model to profit from open-source software’.¹⁹ In the 90s, IBM had been losing ground to Windows and Unix on operating systems, a critical technology for determining the new landscape of business computing, its core activity. In 2001 Gerstner announced that the firm would be

¹⁷ Chesbrough, *Open Business Models*, p. 73.

¹⁸ Larry Huston and Nabil Sakkab, ‘Connect and Develop: Inside Procter & Gamble’s New Model for Innovation’, *Harvard Business Review*, March 2006.

¹⁹ Chesbrough, *Open Business Models*, p. 43.

spending \$1bn on open-source software development—using Linux as ‘a horse to ride’ to grow IBM’s operating-systems business, in which open-source software would be complemented by proprietary middleware: ‘giving one away helps increase sales of the other’, as Gerstner put it.²⁰ IBM and others would ‘support’ free software by selling installation, trouble-shooting and back-up services; by integrating it with proprietary infrastructure—IBM drives, software-hardware interfaces and so on. By transferring its software patents to a non-profit, open-source foundation, it was creating a broader base for its own products and services.²¹

Through a series of calculated tactics, firms can appear to be altruistically contributing technologies to the public domain, while indirectly promoting demand for their products. Software can be ‘versioned’, making it free at entry level but charging a fee for more advanced operations, like MySQL. Free services can produce niche audiences to sell to advertisers, as with Facebook and Google. The game is to use an innovation—even if it is presented as free and public—for profit-making by some other means, ideally in connection with a wide range of related processes. To the extent that the new forms of open innovation entail the ‘free’—as in royalty-free licensing and donations to the public domain—these generally prove on closer examination to be long-run business strategies aiming to capitalize on a wider range of opportunities.²² This is not, as free software developer Richard Stallman put it, ‘free as in freedom’.

Virtual sweatshops

One thing the ‘openness’ paradigm does aim to get for free, or for next to nothing, is labour. When we leave the sphere of the business-school seminar and enter the abode of production, the new business models are shown in a grimmer light. While globalized ‘flexible production’ continues to rely on vast transshipments of goods and lightning-fast capital flows, labour has been far less mobile. With ‘open production’, via the internet and other IT systems such as cellphones, the global labour market can be tapped for a wide range of tasks, from problem solving to

²⁰ Chesbrough, *Open Business Models*, pp. 192ff, 240.

²¹ Joel West and Scott Gallagher, ‘Patterns of Open Innovation in Open Source Software’, in Henry Chesbrough, Wim Vanhaverbeke, and Joel West, eds, *Open Innovation: Researching a New Paradigm*, New York 2006, p. 94.

²² Chris Anderson, *Free: How Today’s Smartest Businesses Profit by Giving Something for Nothing*, New York 2009.

menial work, ushering in a new era of virtual sweatshops. A classic example is the online retailer, Zappos, which had noticed that products with well-written customer reviews sold better than those with equally favourable comments, but plagued by grammar or spelling mistakes. The firm crowdsourced the copy-editing of its 5 million product reviews, using a ‘find, fix, verify’ process, at a mere 10 cents per review—spending a few hundred thousand dollars to generate several million dollars in revenue, while paying virtually nothing to individual editors.²³

The T-shirt company Threadless is another well-known example of the use of crowdsourcing to access labour-market expertise for rock-bottom costs. Anyone can submit a T-shirt design online, anytime. Threadless then orchestrates online competitions, with a modest cash prize to the winner; the judging is crowdsourced, too. As an online message explains: ‘For the next two weeks, let’s watch 8 Threadless designs battle it out—help us decide who wins each battle by “liking” your favourite design on our Facebook page. Those votes will count as 80 per cent of that design’s score. BONUS: One randomly chosen voter will win a \$25 Threadless gift code to pick up the design they voted for!’²⁴ The company has effectively eliminated design labour costs, through the development of skilled yet unwaged work. It is unclear what proportion of Threadless’ designers are financially secure, with time on their hands, or unemployed and reflecting a new desperation: working for nothing, in the hope of using the experience to gain some sort of remunerative employment; ‘immaterial labour’ here being rewarded with immaterial wages—a profound and insidious twist on Hardt and Negri’s vision.²⁵

There are plenty of other examples of ‘virtual sweatshop’ firms that pay next to nothing. Amazon’s ‘Mechanical Turk’ website lists numerous ‘human intelligence tasks’, or HITS, which artificial intelligence cannot handle, despite their relatively simple and repetitive nature. The jobs are submitted by firms which pay the site a fee of 10 per cent for the completed tasks. In 2013 wage rates for individual HITS were as low as \$57.85 for a 7-day job, or \$8.26 a day. A 2010 survey found that 47 per

²³ Panos Ipeiritis, ‘An Ingenious Application of Crowdsourcing: Fix Reviews’ Grammar, Improve Sales’, *behind-the-enemy-lines.com*, 5 April 2011.

²⁴ Jess Hanebury, ‘Threadless Mobb: And the Winner Is . . .’, *threadless.com* blog, 18 March 2013.

²⁵ Michael Hardt and Antonio Negri, *Multitude: War and Democracy in the Age of Empire*, New York 2004; *Commonwealth*, Cambridge, MA 2009.

cent of Turkers come from the US and 34 per cent come from India.²⁶ They generally use their Mechanical Turk earnings to supplement other income, although for over 10 per cent in the US and almost 30 per cent in India, these are their principal earnings. Again, payment is for piece work—for the job, not for a unit of time—characteristic of sweatshop labour.

Virtual sweatshops represent a new tier in the division of labour facilitated by new communications networks, which render localized work even more unstable. Rewards for both ‘high’ and low-end work can be far below the floor of minimum wages: nothing, or a few cents from nothing. Qualified people are working for free, or nearly free, at tasks that have an increasing similarity to those at the low end of the value chain. A recent European study detailed new kinds of precarious labour that entail unregulated freelance work—not quite ‘self-employed’ and not quite ‘dependent employment’.²⁷ The relative dearth of stable, living-wage jobs matched with people’s skills paves the way for an overlap between low and high-end labour forces, reflecting crises of over-qualification and deskilling among skilled workers.²⁸ The result is a world reserve army of *skilled* labour, in addition to the vast ranks of the unskilled, ready to accommodate firms’ needs at all parts of the value chain, while the only compensation for dwindling wages has been an explosion of credit, in turn fuelling corporate growth while consumers linger in debt as a way of life. Credit has become crucial; it is the mechanism by which corporations can sustain markets while paying workers as little as nothing. The description of neoliberal subjects as ‘entrepreneurs of themselves’²⁹ takes on renewed significance as millions scour the global digital landscape for opportunities—working for nothing, apparently living on hope.

²⁶ Panos Ipeirotis, ‘Demographics of Mechanical Turk’, archive@NYU, New York 2010.

²⁷ Manuela Samek Lodovici and Renata Semenza, eds, *Precarious Work and High-Skilled Youth in Europe*, Milan 2012.

²⁸ For discussions of the mismatch between skilled ‘knowledge workers’ in particular and the increasingly unstable, deskilled, and low-paid jobs they take on, see for example: Bill Lessard and Steve Baldwin, *Net Slaves: True Tales of Working the Web*, New York 2000.

²⁹ Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978–1979*, New York 2008, p. 226; the direct quote is: ‘In neo-liberalism . . . *Homo oeconomicus* is an entrepreneur, an entrepreneur of himself.’