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Document Version
Final published version

Publication date:
2003

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Citation for published version (APA):
Miller, P. (2003). *Management Accounting Practices and Assemblages*. Department of Management, Politics and Philosophy, CBS. MPP Working Paper No. 8-2003

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Download date: 27. Sep. 2021



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Paper to be presented at

Eighth Biennial Management Accounting Research Conference

21/22 February, 2003, Sydney, Australia

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Abstract

The roles of accounting in shaping the economy are currently being rediscovered by sociologists (Callon, 1998; Fligstein, 1990; Granovetter, 1985). This recent revival of interest in accounting marks a further stage in a curious pattern of alternate attention and neglect on the part of sociologists towards the practices that make the economy visible and measurable *qua* economy. This paper reviews the different ways in which accounting has been given a wider sociological significance across the twentieth century. It argues for a focus on how new calculative practices emerge within historically specific assemblages, and how they alter the capacities of agents and organisations, and the interrelations among them. Investment appraisal practices are used to illustrate.

The paper is in five sections. Section one introduces the paper. Section two considers briefly the work of Max Weber in the early 20th century, and the link established in his writings between accounting and rationalisation. Section three considers a subsequent stage, with a markedly different focus, namely the emergence in the 1950s and 1960s of a substantial literature on budgeting. Heavily influenced by theories of group dynamics, this literature focussed primarily on management accounting in an intra-organisational setting. Section four examines a further stage, characterised by the elaboration of a range of methodologies from approximately 1980 onwards that had as their concern to analyse the social and organisational aspects of accounting. The methodologies developed and applied here included those that focus on the institutional environments of accounting, the political economy of accounting, ethnographic approaches, and a concern with the networks within which accounting is embedded. Section five considers one particular strand of the recent economic sociology literature, that which concerns the calculative capacities of agents and their embeddedness in social networks. While endorsing the revival of interest in economic sociology, this paper argues that rather than focus on the enduring and transhistorical attributes of agents and networks, emphasis be placed on the roles of accounting within historically localised and temporarily stabilised assemblages of practices. Also, in place of an emphasis on the role of economics and economic theory in formatting the real economy, attention is directed to the more prosaic practices of management accounting which make it possible to act upon persons and processes within and between organisations.

These arguments in favour of focussing on the calculative practices of accounting are illustrated briefly through consideration of a relatively neglected topic in management accounting - investment appraisal. The practice of "investment bundling" as elaborated at Caterpillar Inc in the early 1990s is considered. An investment bundle was defined there as a multi-period capital spending program based on the diverse yet mutually reinforcing assets needed to manufacture a core product module in a specified area on the factory floor. It is argued that the practice of investment bundling as developed at Caterpillar helped operationalise a world-wide transformation of production regimes within a particular corporate setting, and in a manner compatible with the broader problematising of the competitiveness of North American industry which can be termed a "politics of the product". Investment bundling provided a device for intervening within the firm, and in consonance with a broader transformation of concepts of competitiveness and economic citizenship.

1. Introduction

Most experts are indifferent to, or discomforted by their own past. Whether this is due to bad conscience, which can make commentary appear as critique, or a belief in progress, which can make earlier states of knowledge seem irrelevant, is less important than the end result. In the case of accounting, the result is that even today a sociology of economic calculation exists only in embryonic form. It would be wrong, however, to pin the blame for this oversight wholly, or even primarily, on a group of experts who may see little benefit in an enhanced self-understanding of their practice. The real fault lies elsewhere, with a discipline that so far has failed to address adequately one of the most important phenomena of the twentieth century - the growth of those forms of economic calculation to which the name accounting is currently given. It is as if sociology has been too accepting of the economy and its component parts as a given and objective reality *sui generis*, too daunted by a territory populated by apparently complex techniques, too entranced by professions such as medicine and law, and correspondingly disdainful of accounting, to give it the attention it merits. Or perhaps it is simply because social scientists and social authorities prefer to meddle with the lives of the poor, the insane, the excluded or the plain wretched, rather than to seek to understand and explain the calculating practices that make up and represent contemporary capitalism.

This neglect is all the more curious in so far as accounting was accorded a pivotal role at the outset of the sociological enterprise. The writings of Weber placed accounting at the heart of "rational" capitalistic economic activity, while those of Marx accorded accounting a central role in the development and reproduction of capitalist social relations. Yet the initial and bold pronouncements concerning accounting that played an important role in shaping the sociological imagination at the end of the nineteenth and the beginning of the twentieth century were followed by virtual silence on the part of sociologists for

approximately half a century. This silence is all the more surprising in light of the translation into English during this period of Weber's key writings on the subject by Talcott Parsons, the so-called founder of American structural-functionalist sociology.¹ It was not until the 1950s that the interest of social scientists in accounting resurfaced,² to be followed in the 1960s by the burgeoning of "behavioural accounting". And it was only in 1976 that accounting at last had a journal - *Accounting, Organizations and Society*, dedicated to exploring its organizational and sociological dimensions.

The roles of accounting in shaping the economy are currently being rediscovered by sociologists (Callon, 1998; Fligstein, 1990; Granovetter, 1985). While endorsing this revival of interest in the calculative practices of accounting, this paper argues for a focus on how new calculative practices emerge within historically specific assemblages. Rather than begin with the calculative capacities of agents, and their embeddedness in social networks, attention is directed to the roles of accounting within historically localised and temporarily stabilised assemblages of practices, and how accounting practices can alter the capacities of agents and organisations, and the interrelations among them. Also, in place of a concern with the role of economics and economic theory in formatting the real economy, attention is directed to the more prosaic practices of management accounting that make it possible to act upon persons and processes within and between organisations. Investment appraisal practices are used to illustrate.

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¹ *The Protestant Ethic and the Spirit of Capitalism*, first published in German as a two-part article in 1904-5, was translated into English and published in 1930. *The Theory of Social and Economic Organization*, a translation of Part I of *Wirtschaft und Gesellschaft*, was published in 1947. It is also interesting to note that Karl Polanyi's *The Great Transformation*, a book which hints strongly at the need for a sociology of the market and of finance, was published in 1944.

² See, for instance, Argyris (1952), Dalton (1959), Whyte (1955).

stage, with a markedly different focus, namely the emergence in the 1950s and 1960s of a substantial literature on budgeting. Heavily influenced by theories of group dynamics, this literature focussed primarily on management accounting in an intra-organisational setting. Section four examines a further stage, characterised by the elaboration of a range of methodologies from approximately 1980 onwards that had as their concern to analyse the social and organisational aspects of accounting. The methodologies developed and applied here included those that focus on the institutional environments of accounting, the political economy of accounting, ethnographic approaches, and a concern with the networks within which accounting is embedded.

Section five considers one particular strand of the recent economic sociology literature, that which concerns the calculative capacities of agents and their embeddedness within social networks. It is argued that, rather than the attributes of agents and networks, we should focus on calculative practices and the assemblages of persons and organizations they help form. These arguments are illustrated briefly through consideration of a relatively neglected topic in management accounting - investment appraisal. The practice of "investment bundling" as elaborated at Caterpillar Inc in the early 1990s is considered. An investment bundle was defined there as a multi-period capital spending program based on the diverse yet mutually reinforcing assets needed to manufacture a core product module in a specified area on the factory floor. It is argued that the practice of investment bundling as developed at Caterpillar helped operationalise a world-wide transformation of production regimes within a particular corporate setting, and in a manner compatible with the broader problematising of the competitiveness of North American industry which can be termed a "politics of the product". Investment bundling provided a device for intervening within the firm, and in consonance with a broader transformation of concepts of competitiveness and economic citizenship.

2. Accounting and Rationalisation

Max Weber, writing in the first two decades of the twentieth century, considered accounting to be at the heart of the rationalisation of society under capitalism. Weber rejected the idea that capitalism was a matter of greed or acquisitiveness. Instead, he argued, capitalism should be understood as the continuous pursuit of profit by means of "rational, capitalistic enterprise" (Weber, 1930, p. 17). Economic action, according to Weber, is capitalistic in so far as it depends on an expectation of profit through the utilization of opportunities for exchange. And this "rational" pursuit of profit required as its counterpart calculations in terms of capital. The modern, rational organization of capitalistic enterprise would not have been possible, Weber argued, without the calculative practice of bookkeeping.

Rationalisation provided the overall theme for Weber's sociological project. This multidimensional rationalisation of the conduct of life was termed *Lebensführung*. Weber was concerned with the conditions which gave rise to and enabled the spread of the "specifically modern calculating attitude" (Weber, 1978, p. 86). Accounting, in the sense of both budgetary management and capital accounting, was central to his analysis of the sociological conditions of economic activity. He argued that money is "the most 'perfect' means of economic calculation" (Weber, 1978, p. 86), that is, "formally the most rational means of orienting economic activity" (Weber, 1978, p. 86). Calculation in terms of money, rather than its actual use, was the mechanism by which rational economic provision could be conducted, and capital accounting was the form of monetary accounting peculiar to rational economic profit-making:

Weber defined an economic enterprise as "autonomous action capable of orientation to capital accounting" (Weber, 1978, p. 91), and stated that "this orientation takes place by means of 'calculation'" (Weber, 1978, p. 91). To this extent, he placed a concern with

calculation at the heart of a sociological analysis of economic activity. Calculation was the crucial mediating machine, located mid-way between rational profit-making enterprises and the opportunities available to them. Double entry bookkeeping, according to Weber, was "the most highly developed" (Weber, 1978, p. 92) form of bookkeeping, in so far as it permits "a check in the technically most perfect manner on the profitability of each individual step or measure" (Weber, 1978, p. 93).

Weber's arguments were complemented by those of Sombart who put forward a similar albeit stronger argument concerning the relationship between double-entry bookkeeping and capitalism. Sombart argued not only that rational calculation was important to the capitalist enterprise, but went so far as to speculate whether it was double entry bookkeeping that had given rise to capitalism. The plausibility of this proposition is less important than the pivotal role and sociological significance it gave to economic calculation. It accorded economic calculation a central and formative role in economic activity, rather than a subsidiary role. Together with the arguments of Weber, Sombart helped establish a link between accounting and sociology that has continued to the current day. Accounting was identified as a proper object of sociological analysis.

Prior to Weber, Marx had also signalled the importance of the relationship between accounting or bookkeeping and capitalism. In an oblique reference to the imaginary world of political economy, Marx remarked in Volume I of *Capital* that one of the first tasks of Robinson Crusoe on his desert island is to keep a set of books (Marx, 1974a, p. 81). In Volume II of *Capital*, where Marx deals with the costs of circulation, namely those associated with the transformations of the forms of capital from commodities into money, and from money into commodities, he addresses the issue of the labour-time expended in bookkeeping. A part of the variable capital has to be used, he argued, to ensure that the process of circulation can continue. Bookkeeping is depicted as a deduction from the productive process, albeit an essential part of the circulation process. The machinery of the office, which includes labour power, thus mirrors the movement of value through the productive

process (Marx, 1974b, p.136). In so far as capital seeks its own reproduction, this deduction from what Marx regarded as the real process of production is an essential part of the capitalistic process. And as the production process becomes ever more social in character, and loses its individual character, bookkeeping becomes ever more necessary.

Marx did not accord accounting as central a role as did Weber. None the less, when placed in the context of a theory of value and the concept of mode of production, Marx gave accounting an important place alongside other political interventions in the relations of production. In Marx's writings, accounting is accorded a macro-structural role, both shaping and reproducing the nature of capitalist relations of production. To this extent, Marx and Weber occupy a similar terrain. For both, accounting helps define the social and economic relations that define a society. Thus did the interrelation between accounting and sociology commence. However, little was to be made of these beginnings until the 1950s and 1960s when "behavioural accounting" began to emerge.

3. Accounting, Sociology and the Analysis of Groups

Following the writings of Weber and Sombart, there was little or no interaction between the disciplines of accounting and sociology until the 1950s. When a sociological concern with accounting did resurface in the 1950s, the focus had shifted from a macro-level concern with processes of rationalisation and accumulation to a more micro-level concern with groups, group dynamics, and the role of accounting in them. One can mark the shift by reference to Chris Argyris' (1952) seminal paper on the impact of budgets on people. Argyris examined what "budget people" think of budgets, and how factory supervisors think differently about budgets. He combined a study of accounting practices with a sociological concern with groups. Rather than taking groups as given and self-evident, he described the interaction between people and budgets as one of the *creation* of groups. If management

puts increased pressure on individuals, he argued, groups are likely to form. These groups can in turn help absorb the increased pressures placed by management on individuals. Once formed, such groups can persist even after the initial pressure to produce them has disappeared.

In proposing that the interaction of people and accounting practices be understood in this way, Argyris was drawing on two decades of research in sociology which had substantially re-focussed the discipline since the late nineteenth and early twentieth century. From 1930 onwards, groups and their dynamics became a major preoccupation for social scientists. The boundaries between social psychology and sociology became blurred, and social scientists found groups everywhere. The character of Elton Mayo is central to this change in ways of analysing the relational life of the enterprise. The studies conducted under his supervision at the Western Electric Company's Hawthorne Works in Chicago between 1927 and 1932 illustrate the transformation. These studies had a clear conclusion: the dynamics of groups explain changes in industrial output more successfully than changes in the physical environment. Further, the relations among individuals, and between an individual and his or her work, should no longer be considered explicable in terms of a bundle of physiological attributes. The enterprise can be viewed as a social system, and interpersonal relations and group dynamics are at the heart of this social system.

A number of other influential administrative theorists endorsed and extended this sociological analysis of groups and their importance within the firm. As early as 1918, Mary Parker Follett had sought to sketch out a role for the modern corporation within a democratic polity, arguing that the modern corporation should be the principal arena within which a group ideal of democracy could be realised (Follett, 1918). Her position was simple: there is neither individual nor society, but "only the group and the group-unit - the social individual" (Follett, 1918, p. 21). Two decades later, Chester Barnard remarked that "the most usual conception of an organization is that of a *group* of persons.." (Barnard, 1938, p. 68). He argued that the "system of interactions" is the basis of the group, and that formal

organization should be regarded as “a system of consciously coordinated activities or forces of two or more persons.” (Barnard, 1938, p. 73). World War II and its immediate aftermath provided a “laboratory” in which group relations could be studied in their depths and details (Miller, 1986).

In the 1950s and 1960s, the concept of the group became a central preoccupation for the rapidly expanding discipline of sociology. The sociologist George Homans (1951) was the first to attempt a theoretical synthesis based on the concept of the group. A range of influences as diverse as Freudian theory, Kurt Lewin’s social psychology and the sociometry of Moreno fuelled the growing interest in the study of the small group. The contribution of Homans was to attempt to draw these diverse strands together, and to work towards a general sociological theory which would make the group the starting point for the study of social relations.

Alongside the theoretical synthesis being attempted by Homans, sociologists were busy examining issues such as absenteeism, staff turnover, morale, productivity and industrial conflict as problems of group relations. A “wildcat strike” was analysed by Gouldner (1954) in terms of a “general theory of group tensions”. The interrelations between individuals, or “inter-relatedness” as he described it, was the focus for Gouldner’s concerns. The painting of toys in an assembly line situation could just as readily be understood in terms of group dynamics and intergroup relations, as Strauss (1955) demonstrated. Strauss depicted the factory as a social system made up of mutually dependent parts. And Dalton (1959) proposed that cliques, small groups of persons with a common interest, could be the indispensable mechanisms for promoting, stabilizing and resisting change.

This line of reasoning was reinforced by a number of writers on the other side of the Atlantic. Bion (1946) coined the idea of the “leaderless group” as a way of analysing the location of the individual within a complex of interpersonal relations. Jaques (1951) depicted industrial conflicts between managers and workers as manifestations of underlying problems of group relations. In place of an industrial relations model of bargaining, he proposed a

psychotherapeutic one that he termed “working through”. And even accidents at work came to be defined as matters of group relations. Rather than view accidents in terms of a dangerous physical environment to which individuals were exposed, they were understood in terms of legitimate forms of withdrawal from the work situation.

“Behavioural accounting” is the label used to describe the wave of studies which appeared from the late 1950s onwards, and which built on these developments in the sociological analysis of groups. Located at the point of intersection of sociology and accounting, behavioural accounting examined in differing ways the interrelations between accounting and group relations. In an early paper directed more towards sociologists than accountants, Dalton (1959) showed how pressure to meet cost targets, when combined with reward schemes based on success in meeting such targets, can result in the distortion of records. Drawing on theories of decision-making (March & Simon, 1958) and the ideas of “human relations” writers such as McGregor (1960), Likert (1961) and Herzberg (1968), behavioural accounting consolidated the focus on group relations within organizations.

The organizational and behavioural aspects of budgeting became a central preoccupation of researchers across the 1960s and early 1970s. Becker and Green (1962) extended the concerns of Argyris with the group dynamics of budgeting processes. They examined the interrelations between the cohesiveness of work groups and the acceptance of budget goals, and the impact of this interrelation on outcomes. A highly cohesive work group with a positive attitude towards the budget goal would be likely to yield maximum output, while a similarly cohesive work group with a negative attitude towards the budget goal would result in a slowdown of production. As with Argyris’ study, group process and dynamics appears to be the key factor in explaining the budget process. Hofstede went one step further by depicting the budgetary process as a game which people play for its own sake. Although Hofstede found some evidence that participation in the budgetary process was positively associated with motivation to meet budget targets, the results were mixed. Participation appeared to be a necessary but not sufficient condition for high budget

motivation. Target levels needed to be realistic, and the attitudes of senior managers was also important. The key ingredient, however, was identified by Hofstede as the “game spirit” with which managers entered the “budget game”.

This line of reasoning was extended significantly by Hopwood (1974), who drew explicitly on sociological and administrative theories of groups and organisations. He problematized the link between participation and budgeting, arguing that participation can mean almost anything to anyone and adding that much of the debate had turned inquiry into dogma. Hopwood re-focussed the debate by identifying three distinct ways of using budgetary information in the evaluation of managerial performance. He identified a “budget constrained” style, a “profit conscious” style and a “non-accounting” style. Empirical evidence indicated that both the “budget constrained” and “profit conscious” styles of evaluation resulted in a higher degree of involvement with costs than the “non-accounting” style. Only the “profit conscious” style, however, succeeded in achieving this involvement without defensive behaviour or undue tension and worry on the part of the managers in charge of the cost centres. The “budget constrained” style often resulted in manipulation of accounting reports, incorrect charging to budgets, delays in carrying out repairs until the money was available in the budget, and a general deterioration in the relationships between managers and those to whom they reported.

Two decades of research into the behavioural aspects of budgeting and related evaluation mechanisms transformed the discipline of accounting. In the process, the interrelation between accounting and sociology was altered permanently. Accounting was no longer to be perceived as a purely technical process, but was to be viewed as organisational and behavioural. What this meant, however, was soon to change in line with developments in sociology and the wider social science environment.

4. Accounting as an Organizational and Social Practice

If behavioural accounting was firmly established by the mid-1970s as a way of posing sociological questions about accounting practices, its focus was almost exclusively focused on processes that occurred within organisations. The agenda outlined by those such as Weber, Sombart and Marx, and that sought to analyse the interrelations between large-scale social change and accounting change, had been almost entirely supplanted by a concern with groups and group dynamics.

The need to remedy this by reinstating the macro-level analysis of accounting was set out clearly by Hopwood (1974). He argued that the processes by which groups influence and control the accounting function within organisations is matched by pressures arising in the wider social and economic environment. To the extent that much contemporary accounting reflects the ethos of capitalism, so too would one expect the forms and philosophies of accounting to change in line with changes in the social and political environment. He reinforced this point in 1976 in an editorial in the first edition of *Accounting, Organizations and Society*. He spoke there of an “urgent need for research which can provide a basis for seeing accounting as both a social and organizational phenomenon” (Hopwood, 1976, p. 3), arguing that studies of power, influence and control should complement studies of the behavioural aspects of accounting within organizations.

It was to be a few more years, however, before things began to change. In 1978, Hopwood could still comment that there had been little research which addressed the wider social and political influences on accounting. The more micro-level focus characteristic of the north American research tradition continued to dominate, in contrast to the more macro European approaches focusing on questions of organizational sociology and the broader structural and environmental influences.

Even as late as 1980, a sociological analysis of accounting that could blend successfully micro-level and macro-level concerns remained largely an aspiration. Indeed, it

was not even clear what concepts and issues would guide such a research agenda. Some suggestions, however, were put forward in 1980 in an influential paper which sought to identify the roles of accounting in organizations and society (Burchell et al, 1980). A wide range of hitherto neglected issues should, it was argued, be brought within the purview of accounting researchers, and the basic premise on which accounting was analysed should change. Rather than seeing the technical dimensions of accounting as independent of the social dynamics, they should be seen as interrelated. Just as Argyris had argued that accounting practices can create groups, so too it was argued can accounting create other social forms. The role of accounting in creating organizational visibility, in creating particular patterns of organizational and social management, and in creating structures of power needed to be addressed. The analysis of accounting within organizations should be connected explicitly with the analysis of more general forms of economic and social management. Accounting should, that is to say, no longer be conceived as a purely organizational phenomenon. The earlier tradition of sociological enquiry concerning accounting, as embodied in the writings of Marx and Weber, was appealed to as having identified issues worthy of systematic study. Processes of rationalisation should be addressed, as should the mythical, symbolic and ritualistic roles of accounting. Studies of the organizational roles of accounting should be complemented by studies of the societal roles of accounting.

From 1980 onwards, things began to change. The range of methodologies drawn upon by researchers broadened, as did the focus. Institutional structures and processes, and their interrelations with accounting practices, were given increasing attention. Across the following two decades, the interactions between sociology and accounting altered. The sociological analysis of accounting came to be located more within the discipline of accounting, and in the process the concepts used and the definition of the object of attention itself altered. No longer was it simply a matter of applying pre-given sociological concepts to accounting. Rather, the concepts themselves were developed in close connection to the

calculative practices of accounting. The discipline of accounting became more reflective, and itself contributed to the wider development of the social sciences.

Four strands of research contributed to this expansion of the domain of accounting research; first, a concern with the *institutional environments* of accounting; second, a *political economy* of accounting; third, an *ethnography* of accounting; and fourth, the study of the *networks* within which accounting is embedded.

The ground was already laid within sociology and organization theory for the analysis of the institutional environments of accounting. In the late 1970s, the study of the institutionalised “myth structure” (Meyer and Rowan, 1977) of rationalized societies had emerged. Meyer and Rowan argued that prevailing theories neglected a concern with the legitimacy of rationalized formal structures, as distinct from day-to-day work activities. In so far as rationalized and impersonal prescriptions attribute a social purpose to technical activity, and specify the appropriate manner in which to pursue this activity, these rationalized prescriptions were worthy of study in their own right. Terming such prescriptions “myths”, their importance stems from the extent to which they become institutionalized, that is to say taken-for-granted ways of achieving organizational ends. Such myths, Meyer and Rowan argued, become binding on particular organizations, and shape the development of organizations and societies.

The myths of the accountant thus took their place alongside those of doctors, lawyers and others. Whether it was a matter of a particular category of cost, or the broader ceremonial role attributed to financial values in a rationalized society, myths, organizations and rationalization were to be linked. Echoing some of Max Weber’s formulations, formal organizations were depicted as being driven to adopt practices and procedures defined as rational. The conventions of modern accounting, the vocabularies of personnel experts, and the labels of the organization chart are mechanisms by which organizations come to be linked to their institutional environments. To the extent that organizations incorporate practices defined as rational within their institutional environment, it was argued that they

increase their legitimacy and survival prospects. The rules embodied in such practices then become binding on the organization. The formal structures of organizations thus come to reflect the myths of the institutional environment, rather than the demands of the work activities of the organization.

Viewed in institutional terms, accounting is understood as one of the mechanisms through which organizations come to incorporate rational conceptions of ways of organizing. Accounting is just one of many such practices in contemporary societies, albeit a highly significant one in a number of contemporary western societies . It provides a set of techniques for organizing and monitoring activities, and a language with which to define and delineate organizational goals, procedures and policies. Accounting performs a ceremonial function that helps legitimate an organization among its “users”, whether these be participants within the organizations, stockholders, the public, or regulatory bodies such as the Securities Exchange Commission. Instead of presuming only efficiency effects, the adoption and diffusion of particular accounting practices can be studied with regard to their roles as rational institutional myths. At a societal level, one can study how the amount of accounting done in a particular society or organization is determined by its environment, rather than by the intrinsically necessary technical work processes.

A major new research agenda was opened up by this focus on the institutional environments of accounting. The links between an organization and its environment were accorded a central place in the analysis of accounting. Researchers within accounting were encouraged to look beyond the organization, and to see changes within the organization as dynamically linked with changes in the wider environment. Accounting lost some of its apparent uniqueness in this view, and became part of the cultural apparatus of a society. Budgetary practices within an organization were no longer viewed as a matter only of group dynamics and games among the participants. They could be viewed in terms of the articulation, enforcement and modification of societal expectations of acceptable budgetary practices during a period of organizational decline (Covaleski and Dirsmith, 1988).

Questions such as how this occurred, to what purpose, and from whom and where such expectations arose, could be directed to a range of actors beyond the organization. The increasing dominance of finance personnel in the control of large corporations could be explained by pointing to changes in the strategy and structure of organizations, changes in anti-trust laws, and the mimicking of firms in similar environments (Fligstein, 1990). A shift in intra-organizational power relations is viewed as a result of events within the organizational environment, and as a result of the way in which key actors within organizations define their problems. A range of further studies drew more loosely on the institutional perspective (Berry *et al*, 1985; Espeland and Hirsch, 1990; Ansari and Euske, 1987), and demonstrated the importance of linking changes in accounting practices within an organization to the demands and expectations of the institutional environment.

A *political economy* of accounting also drew attention to the importance of addressing the macro-environment within which organizations exist, and did so in ways that drew upon and extended the writings of Marx and later writers. Political economy writers emphasised the conflicting political and economic interests at stake in accounting, and the importance of addressing such interests both within and beyond the organization. They placed particular emphasis on the ways in which power relations, which are historically specific, are shaped by and in turn shape accounting practices. The image of accounting as a technically neutral and objective practice was rebutted sharply by political economy writers. Accounting was viewed instead as a partial and interested language and practice, one that represents and reinforces the interests of particular occupational groups and classes.

The scene had been set for a renewal of interest in political economy issues by the publication of *Labor and Monopoly Capital* (Braverman, 1974). This was an intellectual call to arms to those interested in understanding changes in the productive process and in the occupational structure of the workforce which had occurred across the past century. For, as Braverman stated, little had been added by political economy writers to the analysis of such

issues since Marx's death. Braverman pointed particularly to the emergence of a new stratum of clerical workers in monopoly capitalism, and emphasised that although clerical workers had existed in the nineteenth century, this new stratum was fundamentally different both in terms of social status and their role within the productive process. He vividly charted the growth of a new class of worker whose sole task, he argued, was the increasingly complex one of representing value in monopoly capitalism. He argued that entire new industries had emerged, such as banking and insurance, in which "the productive processes of society disappear into a stream of paper" (Braverman, 1974, p. 301). Monopoly capitalism, according to Braverman, devotes ever more resources to accounting for value, to the point at which the labour expended on such processes begins to approach or even exceed the labour used in producing the underlying commodity or service. The growth in the amount of accounting carried out in monopoly capitalism, according to Braverman, is not just a function of increasing complexity. It is a matter also of trust, or the lack of it. A presumption of dishonesty, "the first principle of modern accounting" (Braverman, 1974, p. 303), gives rise to the immense duplication which is at the heart of double-entry bookkeeping. And if distrust is the norm, then auditing, cast by Braverman with deliberate irony as a "profession of honesty", is called forth to certify to outside parties the truth of the financial records. Out of all these differing demands, Braverman argued, emerges a vast paper empire which appears as real as the physical world, and which comes increasingly to dominate it.

Within accounting, a number of writers developed and extended the political economy approach, albeit with differing emphases. The changing form and content of *Annual Reports* were linked to changing strategies of capital accumulation (Neimark, 1992; Neimark and Tinker, 1986). A "social critique of accounting" was proposed, coupled with a proposal for an "emancipatory accounting" (Tinker, 1985, p. 201). Other writers in the same tradition drew less directly from the writings of Marx, and more from recent political economy approaches. Variations in modes of regulation of accounting practices were linked

to variation in the institutional and political structures between countries (Puxty *et al*, 1987). The roles of accounting in industrial relations and wage determination negotiations were addressed (Bougen, 1989; Bougen, Ogden and Outram, 1990). The dominance of accounting controls over the labour process in the UK were explained by reference to the “collective mobility project” of the accounting profession in the UK, and the dominant position it has achieved within the “economic functions” of the global function of capital (Armstrong, 1985, 1987). And the differential spread in the US and the UK of practices such as standard costing, budgeting, and performance reports were examined using an historical-comparative method. A number of further studies were conducted drawing broadly on the principles and concepts of political economy. The interaction between state actions and the distributional consequences of accounting policies were examined (Arnold, 1991), as were the links between cost accounting techniques and attempts to control the labour process. More recently, the importance of using concepts of class, ideology and social structure in analysing labour relations, and a factory reorganization programme in particular, has been reaffirmed (Arnold, 1998; Froud *et al*, 1998).

A different agenda, one that can be labelled an *ethnography* of accounting, also emerged in the early 1980s. The concern here was with the meanings and perceptions of the actors who develop and use accounting practices in localised settings. The conditions and consequences of accounting in specific organisations provided the focus here. The “lived experience” of individual actors was addressed through case analyses that emphasised the symbolic use of accounting for individuals (Boland and Pondy, 1983). An understanding of how accounting practices contribute to the production and reproduction of organisational life was the aim of such research (Roberts and Scapens, 1985).

An ethnography of accounting seeks to understand what was said, done and understood in a particular situation. A focus on the changing relations between volumes and costs in advanced manufacturing (Jonsson and Gronlund, 1988) allows one to understand how practices and procedures are worked out in local settings. In so far as new ways of

accounting have to be understood and made sense of, an understanding of accounting change in a particular organisation can similarly be facilitated by referring to the meanings people attach to the social world (Nahapiet, 1988). The emergence of a new accounting based organisational culture can be analysed using an interpretive or ethnographic frame (Dent, 1991). The fabricating of budgets (Preston *et al*, 1992), and the influence of the inspection and review processes of the British Inland Revenue on internal accounting processes (Preston, 1989), can highlight the chains of reasoning involved. An ethnography of three hospitals can help us understand how and why new accounting numbers are produced, and how the social linkages among a relatively small group of people enables this to occur (Chua, 1995). Meanwhile, the process of “becoming” a professional accountant (Power, 1991) can be viewed as analogous to that of the “moral career” of the mental patient (Goffman, 1961). More generally, one might say that most behaviour, even within the sphere of the market-driven economy, is deeply embedded in networks of interpersonal relations (Granovetter, 1985).

A fourth agenda focussed on the networks within which accounting is embedded. As with all three of the previous themes identified, this grew out of developments within the wider social sciences as well as from attempts to address intellectual challenges identified by accounting researchers. In so far as previous research within accounting had sought to analyse and explain the links between accounting and the environment, a dualism had formed: on the one hand there was the environment, on the other the organization. In place of such a dualism, a number of writers began to explore more dynamic and process-based ways of explaining the interrelations between organisations and their environments. Burchell *et al* (1985) called for researchers to analyse the interpenetration between accounting and society. Instead of two mutually exclusive domains - “accounting” and “society” - attention was focussed on the specific practices and institutions in which the accounting category “value added” appeared. In this interpretation, the environment is not external to accounting but “passes through” it, and accounting in turn shapes and modifies the social. Burchell *et al*

examined three “arenas”: accounting standard setting, the management of the national economy, and the industrial relations system. The “accounting constellation” was the particular social space where these three arenas intersected and intertwined, a network or assemblage of intersecting practices, processes and institutions. The “value added event” is a field comprised of a very particular set of relations established between institutions, economic and administrative processes, bodies of knowledge, systems of norms and measurement, and classification techniques. In a related manner, although drawing on different reference points within sociology, Robson (1991) set out explicitly to apply and extend this approach in a study of accounting standard setting in the UK. Drawing upon the writings of Latour (1987, 1988), he focussed on discursive processes of accounting change, and the concept of translation in particular. Accounting change occurs, Robson argued, when a particular group or institution is able successfully to enrol other actors in their proposals by incorporating and translating the interests of others into the solutions proposed. In this process, problems are defined as shared, alliances formed, arguments mobilised, and the interests of other groups, parties and institutions enrolled towards a common interest.

These four research agendas clearly do not exhaust the sociological analysis of accounting across the past two decades or so. They serve, however, to indicate the extent to which accounting researchers have redefined the domain of accounting research by drawing on and contributing to sociological research. In the following section, the revival of interest in economic calculation among sociologists in the past decade is considered in greater detail.

5. Agents, Networks, and Assemblages of Practices

The recent rediscovery of the economy by sociologists has taken a particular form. The focus has been on the ways in which calculating agents embed economic processes in social networks. An early contribution by Polanyi (1957), which argued that the economy should be viewed as an “instituted process”, provides an important reference point for this literature. Polanyi spoke of “the transcending importance of the institutional aspect of the economy” (Polanyi, 1957; cited in Granovetter and Swedberg, p. 34), and argued that it is the instituting of economic processes that integrates them and gives them unity and stability. Polanyi identified three forms of integration - reciprocity, redistribution and exchange - and argued that their integrating effect is conditioned by definite institutional arrangements. Integration, according to Polanyi, means something more than the aggregation of individual behaviours and interactions.

Three decades later, and in a similar vein, Granovetter (1985) argued that economic behaviour is “embedded” in a network or system of social relations. Sociologists since Weber had, he argued, cut themselves off from a large and important part of the European tradition, as represented particularly by Max Weber. For that tradition, economic action is viewed as only one category, albeit an important one, of social action. Interlocking directorates among firms, industrial purchasing, subcontracting relationships, intrafirm audits and transfer pricing, are identified by Granovetter as examples of the important role played by webs of social relations in shaping economic behaviour. Most economic behaviour, according to Granovetter, is closely embedded in networks of personal relations. Rather than view these relations as merely causing friction within an otherwise rational market process, such relations were seen by Granovetter to be central and amenable to sociological analysis. Careful and systematic attention is required, he argued, to the actual patterns of personal relations through which economic transactions are carried out.

More recently, Callon (1998) has addressed the issue of embeddedness, with particular respect to the interrelation between the economy as a thing and economics as a

discipline. Arguing that economics as a discipline shapes rather than observes the economy, Callon's arguments are broadly consistent with those of many accounting researchers across the past two decades.³ If accounting practices and concepts shape ways of organising economic processes within and among organisations, it is consistent to expect a similar interrelation between the discipline of economics and the formation of actual markets. Whereas accounting researchers have tended to focus on particular calculative practices or ideas, Callon's focus is on the more general issue of the calculative capacities of agents. According to Callon, calculating is a complex calculative practice that involves tools and inscriptions. Also, calculating is viewed as intrinsically linked to the networks within which agents are entangled. Appealing explicitly to Granovetter's notion of embeddedness, Callon argues that the calculative capacities of agents are inseparable from the network of social relations in which they are situated. The agent is not immersed in a network viewed as a context or an institutional environment. Rather, agents and networks are considered to be two sides of the same coin. The ability of agents to calculate is wholly dependent on the network of relations within which the agent is immersed.

This attempt to avoid the distinction between macro- and micro-, as well as the notion of context, is consistent with earlier writings in the accounting literature discussed above. Equally consistent is a focus on the intrinsic links between calculative agents and networks. But the primacy attributed to the concept of network, the notion that networks are webs of interconnected agents, and the emphasis on the role of economics in shaping the economy, raises a number of issues for accounting researchers. To address these issues, consider the following propositions.

First, if a history of the construction of markets and market organisations is yet to be invented, this should commence with an analysis of the concepts and practices through which such a domain is formed. Rather than presume and begin with the role of networks in

³ For a summary of these debates, see Miller (1994).

connecting agents, we should focus on the historically and geographically variable practices that make calculation possible. For it is these practices that make it possible to intervene, to act upon and alter the capacities of individuals, entities and processes, to transform them and achieve specific ends. It is through calculative practices that we can affect the type of world we live in, the way in which we understand the choices open to organisations and individuals, the way in which we manage and organize the activities of others and ourselves. Accounting researchers should attend to the complex interplay between ways of calculating and ways of managing social and organizational life. A history of the formation of markets and of the economy should commence with the heterogeneous practices and ideas that have made organizational life calculable.

Second, rather than presuming that the discipline of economics shapes the actual economy, we should examine empirically the complex of knowledges and practices that reflect on and intervene in economic life. To study the economy "as a thing", we should not necessarily take economics as a starting point. We should consider instead the relations among the disparate disciplines and practices that have helped shape the economy in its modern form. Accounting, actuarial science, applied psychology, engineering, finance, and operations research are just some of the disciplines we should be considering. Clearly, a number of these disciplines have important interrelations with economics, and in some cases have borrowed extensively from economics (Miller, 1998). It is the assemblages that form among a variety of concepts and practices, the variable boundaries between them, and the interventions that they make possible, that we should attend to.

Third, we should pay attention to the links between calculative practices and the programmes they seek to operationalise. Instead of presuming that the triptych of agents, networks and calculation set out by Callon exhausts the relevant domains, we should consider the ways in which calculation is endowed with a significance that extends beyond the immediate tasks to which it is put. Within individual organizations, the calculation of costs can be linked to much wider concerns, such as national competitiveness and the

perceived need for benchmarking. Rationales such as decision-making, responsibility, and efficiency can give meaning to apparently mundane tasks such as budgeting and variance analysis. And, on a much broader scale, the language of markets can help transform the boundaries between the private and the public sector, and call forth an avalanche of numbers produced by a variety of calculating machines. Liberalism and neo-liberalism are not just models for the conduct of economic activity, but for the whole of social life. The concept of the market provides a rationale not only for the exchange of goods and services, but an idea and an objective for transforming citizens and institutions that had previously operated according to very different logics. Whether it is a matter of the delivery of health and social care, and the boundaries between them, or the monitoring and evaluation of the police and probation services, ways of calculating are intrinsically linked to wider political concerns.

In the following section, these arguments concerning the importance of focussing on calculative practices, and the assemblages they help form, are illustrated by considering the issue of investment appraisal practices at Caterpillar Inc in the late 1980s.

5.1 Re-thinking and re-appraising the factory: investment bundling practices at Caterpillar Inc

The process of “re-thinking the factory” in the USA across the last two decades of the twentieth century, and the specific form this took at Caterpillar Inc, illustrates the way in which the calculative practices of accounting help form an assemblage of persons, processes and things.⁴ Rethinking the factory refers to a physical reconstruction of the

⁴ Interestingly, while previously published work on this issue by the author has received considerable critical attention, the accounting practices that were central to the transformation of the factory at Caterpillar Inc have been largely ignored. On these issues, see Arnold (1998), Froud et.al. (1998) and Miller and O’Leary (1994a, 1994b, 1998, 2002).

factory, as well as a reconstruction of practices and ideas about how to govern the “customer-driven” factory. It entailed a transformation of managerial beliefs about how international competitiveness should be maintained. New accounting practices were central to the re-organising of factory architectures, shop floor layouts and principles for organizing the flow of material and products.

Rethinking the factory can be understood as comprising two aspects. First, the construction of new programmes for the design and administration of the factory, in accordance with emergent cultural norms. Second, the elaboration of technologies for making such programmes operable. For programmes do not operate on their own. They require technologies, devices for intervening, instruments for acting upon people, objects and processes so as to shape or influence them. Technologies include various forms of calculating, writing, recording, examining, assessing and visualizing that have the capacity to act upon and transform the person, object or process in question. Administrative systems, accounting practices, training systems, organizational forms, systems architectures, filing and information systems, and spatial arrangements of people and machines all share the ability to shape the conduct of individuals indirectly, rather than by force or direct control.

At Caterpillar Inc, rethinking the factory began in the late 1980s by a problematizing of the issue of competitiveness vis-a-vis Japan, and Komatsu in particular. A particular calculative technology - competitor cost analysis - gave visibility within the firm to the general notion of competitiveness that preoccupied so many commentators, consultants, academics and policy-makers. Competitiveness was to be given a number as well as a name. Not only was Komatsu of Japan identified as posing a major threat to Caterpillar, the nature of that threat was distilled into a single financial number. Competitor cost analysis provided a calculative practice that made it possible to establish whether, and to what extent, the firm had a structural cost disadvantage relative to key international competitors. Competitor cost analysis offered a way of making possible a detailed comparison between Komatsu's costs and those of Caterpillar, and at the level of every Caterpillar facility rather than just in

aggregate.

Competitor cost analysis allowed the establishment of company-wide structural cost reduction targets, and individual product-by-product targets. A new tool, the “Cost Reduction Progress Report” made it possible to monitor progress in cost reduction. New “rolling” budgetary mechanisms gave operating units detailed spending and employment plans, and gave plant managers and General Office an enhanced visibility of the factors and decisions that were held to affect progress along the cost reduction curve. But competitor cost analysis was more than a technical accounting change. It helped transform the field of accountability for Caterpillar’s personnel. Factories, plants and administrative units were given ways of addressing “the new reality of global competition”. In place of internally engineered performance standards, accountability was to be externally focussed. At all levels within plants, employees were called upon to engage directly with Japanese competition, to address its pervasive effects upon the company as a whole and in every facet of their daily work. By providing a single cost reduction number for the firm as a whole, and for individual product groups, competitor cost analysis targets gave substance to general invocations to consider the Japanese challenge.

But the cost reduction programme put in place in the early 1980s, and the target of 22 per cent cost reduction by 1986, came to be considered insufficient for dealing with the competitive threat from Komatsu of Japan. Something much more far-reaching was held to be required to address a perceived fundamental cost disadvantage vis-a-vis Komatsu. “Revolutionary change”, or a more fundamental rethinking of the factory, was held to be needed. A new factory architecture, one that abandoned functional in favour of cellular organization, came to be viewed as essential to corporate success.

A novel calculative technology - termed “investment bundling” - was central to this new way of framing the issue of competitiveness. The transition to a new manufacturing environment depended on the creation of new physical and calculable spaces. Investment bundling provided a way of making calculable the distinctive architecture of production

based on system principles that was seen as necessary to meet the competitive threat posed by Komatsu of Japan. One particular investment bundle, termed the Assembly Highway, sought to embed new ideas of work, and new identities for workers, in the physical layout of an actual shop floor.

“Investment bundling” entailed dividing manufacturing facilities up into “bundles”, physical areas of a factory floor that encompassed the network of cells needed to manufacture a core product module. A bundle was defined as a:

... grouping of investments which are made for the purpose of manufacturing, assembling, testing, and painting a major component [or core product module]. It occupies a section of the building. It is an entity which can be managed separately. Accounting can identify the costs, inventory and resources needed to run the minifactory.⁵

A calculative practice thus made visible a defined physical area on the shop floor, and in accordance with the notion of a core product module as defined by systems expertise. Investment appraisal thus linked the concept of competitiveness with the actual design of factory layouts. Investment in the new architecture of production was not to be evaluated on a machine by machine basis. Neither was it to be evaluated for each individual cell. Rather, investment was to be made in a series of "mini-factories", each one a physical area on the factory floor that contained a "gate-to-gate process", and that could be managed on its own. As an amalgam or network of cells, a bundle would comprise diverse kinds of assets: the skills of workers, softwares, hardwares, manufacturing machines, and logistics technologies, among others. Financial flows were to mirror the physical flows of the new systems-based model of production, and the injunction to focus externally on

⁵ Memo of P. C. Guerindon, Capital Investment for the 90s, November 10, 1988.

competitiveness vis-a-vis Komatsu of Japan. It was through such a calculative practice that the Plant With A Future (PWAF) program, the most ambitious in Caterpillar's history, was to be managed.⁶ Eighty-two investment bundles, or mini-factories, were identified within the PWAF program. Each of these bundles became a unit of investment analysis, decision, and management.

At the centre of this new approach to investment appraisal was the idea that one invested to achieve synergies among diverse assets, synergies that ought to be reflected in the concept of velocity of material flow. This referred to the speed at which material flowed through the area described by a bundle, thus providing a measure of the extent to which core product modules were being manufactured according to globally competitive cost and quality targets, as well as in response to shifting volumes and patterns of demand. The question that would be asked of every decision pertaining to investment in flexibly specialised manufacture would be: "how competitive am I getting *externally* with this investment [in each "bundle" of technologies]?"⁷ In this way, the practice of investment bundling was to provide a direct and visible link between the shop floor and the competitive environment.

Investment bundling was also to provide a direct and visible link between the financial expertise called for when investing in capital assets, and the quality and performance of the American product. In particular, satisfactory returns on investment (or net present values) at Caterpillar were to be the demonstrable consequences of improving the cost, quality, and competitive capability of core product modules and manufacturing processes. The workings of financial expertise were to be made accountable to the product. The idea was that one invested in systems of manufacture, new architectures of production,

⁶ The PWAF program was eventually to require a commitment of \$1.8bn for the purchase of capital assets, plus \$0.9bn for start-up costs.

⁷ Interview with a former director of manufacturing, June 19, 1990, p. 3, emphasis added.

as a way of acting upon the more general issue of competitiveness. A calculative practice would make visible financial returns, as well as other newly visible competitive issues such as floorspace, inventory and throughput. As physical spaces on the factory floor, and responsibility centers for which net present values could be calculated, investment bundles made operable and manageable the competitiveness of American products on the world markets. Investment bundling provided a technology for acting upon people and processes, and in accordance with a particular corporate program for governing economic life within the enterprise.

Rethinking the factory at Caterpillar Inc in the late 1980s was a densely theoretical and political project. The calculative practices of competitor benchmarking and investment bundling operationalised concerns regarding the competitive threat posed by Komatsu of Japan. Competitor benchmarking gave a financial number and a name to a rather diffuse notion of Japanese competition. But it suggested a rather constrained and inward-looking future. In contrast, the assemblage made calculable through investment bundling practices was a programme for modernisation and reform.⁸ New machines and layouts on the shop floor, new material flows, and new working relationships were to be made calculable through novel investment appraisal practices. An ambitious and corporate-wide programme of investment, rather than retrenchment and cost-cutting, would address issues of competitiveness. Investment bundling linked together abstract notions of competition articulated at a national level, with the manufacturing of a core product module in a particular factory. And it distilled these into a single financial number that could be presented at the level of individual factories, the corporation as a whole, and the capital markets.

6. Conclusions

⁸ On the notion of programmes, see Miller and Rose (1992).

This paper has examined the recent rediscovery of the economy and economic calculation by sociologists. It has outlined briefly the curiously punctuated history of a sociological concern with accounting across the twentieth century. Initially central to sociology at the beginning of the twentieth century, accounting disappeared from view for approximately half a century. When accounting was initially “rediscovered” by social scientists in the 1950s and 1960s, the concern had shifted from a macro-level concern with rationalisation processes to a micro-level concern with groups and group processes. From 1980 onwards, and within the accounting literature, a further shift occurred. Accounting researchers sought to understand and analyse the links between accounting practices within organizations and broader institutional and social pressures. Most recently, there has emerged a concern with the ways in which economic processes are shaped by agents who embed them in social networks. While noting the merits of this renewed interest in accounting by sociologists, this paper has argued instead for a focus on the calculative practices of accounting, and the assemblages they help form. It has illustrated these arguments by considering the roles played by a particular set of investment appraisal practices at Caterpillar Inc in the early 1990s. The practice of investment bundling helped evaluate and operationalise a worldwide corporate transformation of production regimes at Caterpillar Inc, and in a manner consistent with broader concerns with corporate and national competitiveness.

It would be interesting to explore other examples of the ways in which accounting practices, and investment appraisal practices in particular, help form assemblages of different types. At Caterpillar, investment bundling helped articulate a “competitive” model of the firm. In a very different industry - microprocessors - a particular set of investment appraisal practices have helped shape a “cooperative” model of the relations among the firm and its complementors. The devices that were central to achieving this are termed “roadmapping” practices (Miller and O’Leary, 2003). Roadmapping practices as used at

Intel Corp are ways of ensuring that large-scale capital investments made by sub-units of the firm (in assets such as new processes, microprocessor products and manufacturing capacity) are coordinated with one another internally, and that they are aligned also with complementary investments on the part of a wide range of other firms. As a key part of Intel's capital budgeting process, roadmapping practices extend significantly the definition of investment appraisal to include overall coordination mechanisms. In so far as they extend beyond the boundaries of the firm, roadmapping practices are argued to be important devices for helping to operationalise the hybrid organisational assemblages that characterise the modern economy. It remains to be explored how, in this different situation, calculate practices help link together persons, processes and ideas into a working assemblage.

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