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Are Physical Capacity Constraints Relevant?: Applying Finance-Economics Theory to a Management Accounting Misconception

by
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Abstract:

The management accounting literature presents a view that firms normally operate at full physical capacity and consequently often cannot meet customer demand which results in the frequent rejection of profitable business. The finance-economics literature presents a contrary view that firms, seeking to maximise their value, will plan for sufficient physical capacity to meet all profitable business. Finance-economics theory predicts that firms will have spare capacity since economic constraints apply before physical constraints become relevant. This paper presents the results of an empirical study of Australian manufacturing firms which supports the finance-economics view.

Keywords:

CAPACITY CONSTRAINTS, FINANCE-ECONOMICS THEORY, CAPACITY UTILISATION, SPECIAL ORDER PRICING.

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1.   Introduction

A view presented consistently in the management accounting literature is that firms usually operate at full capacity. Because firms are therefore subjected to physical capacity constraints, they frequently have to choose which of their profitable products to produce and in what quantities. The choice is made, according to the literature, by the application of a choice algorithm, and the application of this algorithm results in the loss of profitable sales.

A contrary view presented by finance-economics theory is that managers maximise the value of the firm by undertaking *all* profitable projects (production). With 'profitable' defined in economic terms, finance-economics theory predicts that firms are subject to economic constraints which apply well before physical constraints become relevant. It predicts that in competitive markets, efficient production results in firms having spare capacity most of the time.

The paper is structured as follows. Sections 2 and 3 present the divergent claims relating to capacity issues from the management accounting and finance-economics literature respectively. A derivative issue, that of special order pricing, is also discussed in these sections. Section 4 applies well-established finance-economics principles to explain why the management accounting view on capacity constraints is a misconception. Since the two views are diametrically opposed, only one can be an accurate descriptor of the real world. Ultimately the differences can only be resolved empirically. Section 5 reports the results of a survey of Australian manufacturing firms. Conclusions are drawn in section 6.

2.   The Management Accounting View

2.1   Capacity Constraints Force the Rejection of Profitable Sales

A review of the management accounting literature reveals a widespread and longstanding view that firms are generally subject to capacity constraints, and therefore typically operate at full capacity, with capacity defined in *physical* terms. For example:

> Firms usually have limits on several important variables. Constrained resources can include, but are not limited to, materials, skilled labour, floor space, machine hours, water availability, funds, and so on. (Hirsch 1988, p. 183)

As a consequence of being physically constrained, firms choose which of their profitable products to produce—that is, which business to accept. This necessitates firms having to apply the choice algorithm (maximise the contribution margin of the limiting factor, or some surrogate for that decision rule) in selecting which business to accept, and results in the rejection of profitable sales.

Helmkamp (1990, p. 301) explains the view that permeates the literature:

> *Every business faces scarce resources* that must be used in the most optimal way to earn maximum profits. These scarce resources are limitations (also called constraints) for managerial decision-making purposes because *they restrict how the firm can operate*. For example, a manufacturing firm will *have a limited amount of production capacity* as measured by machine hours or direct labour hours...the most profitable product mix is determined in a multiple-product situation by relating the contribution margins of the

products to the constraints of the firm. In this way, management can maximize the total contribution margin in relation to these constraints, thus ensuring that the scarce resources are used in the best way. (emphasis added)

Not only is the above view consistently expressed in the literature[1], but the position taken is that full capacity is not *occasionally* the scenario for firms, but it is the *normal* condition for firms. Hilton (1994, p. 670) explains:

Organizations *typically* have limited resources...operating with limited resources, a firm *often* must choose between sales orders, deciding which orders to fill and which to decline. In making such decisions, managers must decide which product or service is the most profitable. (emphasis added)[2]

2.1.1 Algorithms for Choosing Which Orders to Accept/Reject

Given the presumption that firms are normally constrained in physical terms, the management accounting literature provides various algorithms for selecting which of the firm's profitable products to produce: that is, given the firm operates at full capacity, which orders will be accepted and which customers will be rejected. In the presence of a constraint, the literature consistently recommends the decision rule: choose the product with the highest contribution margin *per unit of the limiting factor*. This solution is described by Morse and Roth (1986, p. 307):

Many organisations...face capacity constraints which prevent them from producing as many units of each product as they desire. When a single factor, such as labour hours or machine hours, limits production, management should maximise the contribution per unit of the constraining factor in determining which product to produce and sell.

In complex scenarios involving multiple products and multiple constraints, linear programming models are recommended as a method of selecting the optimal production mix given the physical constraints.[3]

2.1.2 Special Order Pricing

An issue derived from the 'full capacity' view is the pricing of special orders. The management accounting view considers firms to be typically operating at full capacity, therefore the existence of spare capacity is rare:

Management *sometimes* faces the decision of accepting or rejecting one-time-only special orders when there is idle production capacity (emphasis added) (Horngren et al. 1994, p. 390)[4]

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1. See, for example, Anderson et al (1989, pp.462-3), Atkinson et al (1995, p. 330), Davidson et al (1985, p. 308), Drury (1992, p. 246), Hilton (1994, p.670), Horngren et al (1994, p. 70, p. 393), Kaplan and Atkinson (1985, p. 63), Lere (1991, p. 169), Moriarity and Allen (1991, p. 215), Moscove and Wright (1990, p. 726), Polimeni et al (1991, p. 614), Raiborn et al. (1993, p. 727), Rayburn (1989, p. 1414), Ricketts and Gray (1991, p. 244).
2. See, also, for example, Hirsch (1988, p. 183, 'firms *usually* have limits on several important variables'); Horngren et al. (1994, p. 70, 'managers *must frequently cope* with limited resources'); Lere (1991, p. 169, '...they *often* face constraints...'); and Horngren et al. (1994, p. 393-4, 'managers must *often* make decisions regarding which products to emphasize').
3. Linear programming—a sophisticated version of the simpler maximisation rule—is frequently recommended in the management accounting literature. For example, see Horngren et al. (1994, p. 394), Helmkamp (1990, p. 709), Rayburn (1989, p. 1413), Hansen and Mowen (1992, p. 475) and Moriarity and Allen (1991, p. 216).

The literature recommends that on these rare occasions this spare capacity be fully utilised by pricing special orders below the normal market price until no spare capacity remains.

The technique for pricing those special orders is to employ relevant cost analysis, with the special order being priced to cover the incremental variable costs ('out of pocket' costs) plus a markup for profit.

The analysis involves ignoring fixed costs on the basis that in the short-run fixed costs are unaffected by the decision to utilise spare capacity. Further, it assumes that variable cost is constant and unaffected by increases in production. For example, Horngren et al. (1994, p. 390) states that:

> The relevant costs are the expected future costs that differ between the alternatives—the variable manufacturing costs...The fixed manufacturing costs...are irrelevant in this case; they will not change in total whether or not the special order is accepted.

A consequence of treating variable costs as constant is that special order decisions invariably demonstrate that their acceptance is profitable.

2.2 Summary of Management Accounting View

The management accounting literature presents a consistent view of the influence of physical capacity constraints on production decisions and special order pricing. According to the literature, firms normally operate at full capacity.[5] Physical constraints force a firm to choose how the limited capacity will be utilised, and consequently profitable sales are rejected. The rare occurrence of spare capacity may prompt firms to negotiate special one-time-only prices below normal market prices.

On the other hand, finance-economics theory suggests that the management accounting view is *not* descriptive of practice. Accordingly, the solutions to capacity-related problems proposed by the management accounting literature are irrelevant. The following section presents the predictions of finance-economics theory relating to capacity constraints.

3. The Finance-Economics View

Corporate finance theory states that a manager's objective is to maximise the value of the firm, with the investment decision being identified as the crucial determinant of firm value. Bishop et al. (1993, p. 36) describe the role of the investment decision in value maximisation:

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4. The issue of special order pricing is also commonly addressed in the literature. For example, see Anderson et al. (1989, p. 460), Atkinson et al. (1995, p. 336), Davidson et al. (1985, p. 302), Drury, (1992, p. 243), Helmkamp (1990, p. 291), Hilton (1994, p. 663)), Horngren et al. (1994, p. 390), Lere (1991, p. 199), Moriarity and Allen (1991, p. 201), Moscove and Wright (1990, p. 768), Polimeni et al. (1991, p. 606, 7), Raiborn et al. (1993, p. 419), Rayburn (1989, p. 912) and Ricketts and Gray (1991, p. 356).

5. The fact that different definitions of capacity are recognised in the literature (engineered, practical attainable, normal etc.) does not change this conclusion. These different concepts relate to inventory valuation and income measurement, which is not the issue addressed in this paper. Our focus is solely on physical capacity for the purpose of supplying customers.

> The optimal investment (production) decision by the firm is to invest in real assets up to the point where the marginal return from production is just equal to the return foregone by not investing in financial assets, that is, the capital market determined rate of interest. This will result in the maximisation of the market value of the firm.

Accordingly, optimal investment decisions entail marginal cost-benefit analysis. In practice, this analysis can be operationalised through the net present value (NPV) decision rule—invest in all positive NPV projects. Rejection of positive NPV investments does not maximise the value of the firm. Applied to a firm's capacity decisions, the finance-economics framework predicts that value maximisation will result in (1) acceptance (not rejection) of profitable sales; (2) efficient production and spare capacity; and (3) firms being economically not physically constrained.

3.1   Non Rejection of Profitable Sales

A major investment decision of the firm is its productive capacity. Insufficient productive capacity, because it results in the loss of profitable sales, represents a suboptimal investment decision. Since firms always have the option of investing in additional capacity, it is expected they will do so *before* capacity is insufficient to meet profitable sales demand. Consequently, employment of the management accounting choice algorithm is not anticipated by the finance-economics model.

How is 'profitable' sales demand defined? When the marginal revenue of additional production exceeds the marginal costs, it is profitable production. Rejecting profitable sales means rejecting a positive NPV investment opportunity. Firm value is maximised when productive capacity is increased to cover the expected profitable demand over the NPV period. Accordingly, finance-economics theory predicts that firms will invest in productive capacity to enable the acceptance of all profitable sales—surviving firms will not reject profitable business.

3.2   Efficient Production and Spare Capacity

Spare capacity is the difference between the firm's full capacity and its actual output. Due to real world uncertainty over demand, most firms are likely to maintain spare capacity. However, even with certainty of demand firms are still likely to have spare capacity. In competitive markets firms are price takers, and the focus of operations is on achieving efficient (minimum cost) production.[6] Full capacity is *not* the cost minimisation point.[7] Therefore, although firms have the capacity to increase production, they do not do so since it results in average cost rising above the minimum point due to the marginal cost of additional production exceeding average cost. Accordingly, efficient production results in firms having spare capacity which, on economic grounds, is not utilised.

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6.   Efficient production is the minimum point on the firm's average cost curve. In section 4, figures 1 and 2 show that, in competitive markets, efficient production coincides with profit maximising output.

7.   If an industry is characterised by continually decreasing costs due to economies of scale, it is a natural monopoly—not a competitive industry. While telephone and electricity industries are often cited as examples, they owe their monopoly status to legislative barriers to entry rather than decreasing costs. Real world examples of natural monopolies are rare.

3.3   Economic Not Physical Constraint

The cost-benefit approach of finance theory dovetails with the competitive market model of economics, which states that a firm's profit is maximised at the point where the rising marginal cost curve equals marginal revenue (the average cost minimisation point). Production beyond this point is unprofitable in that its costs outweigh its benefits—a negative NPV project. Therefore, although a firm's full capacity is constrained by physical factors (e.g. machine capacity or labour), economic factors will ensure physical constraints are irrelevant to profit maximising production decisions. Accordingly, finance-economics theory defines the constraints on capacity in economic, not physical terms.

In fact, the likelihood of constraints which limit value maximisation is dismissed by finance theory. In discussing the possibility of financial constraints —referred to as capital rationing—Peirson et al. (1995, p. 589) maintain that:

> ...the imposition of capital rationing by management can prevent the maximisation of shareholders' wealth. Capital rationing is not in the shareholders' best interest if projects with positive net present values are rejected.

Finance theory acknowledges that soft (management imposed) capital rationing is contrary to shareholders' interests. Similarly, the existence of hard (market imposed) capital rationing is unlikely. At the market rate of interest, the demand for funds equals the supply—there is no shortage of finance. Any project which can earn a positive NPV at the market rate can obtain finance.

3.4   Summary of Finance-Economics View

The finance-economics view states that firms are economically constrained rather than physically constrained. It predicts that firms frequently have spare capacity, in contrast to the management accounting view that production at full capacity is the norm. Management seeking to maximise firm value will not be employing a choice algorithm that results in the rejection of profitable sales. In the following section, the management accounting view is scrutinised from a finance-economics perspective.

4.   An Application of Finance-Economics Theory to a Management Accounting Misconception

4.1   Capacity Constraints and the Rejection of Profitable Sales

The management accounting view—that firms operate at full capacity by producing to the limit of their physical constraint—is illustrated in figure 1.[8] Note that a certain amount of production beyond full capacity (indicated by dotted lines) is profitable because marginal revenue exceeds marginal costs. The physical capacity constraint prevents the firm increasing production to the profit maximising output. Therefore, as already indicated, profitable sales are being rejected.

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8.   Note that the same conclusions would be drawn if any market condition had been graphed. Whether the market is perfectly competitive, or an oligopoly or monopoly exist, application of a physical capacity constraint means that firms will cease production before the optimal, profit maximising point.
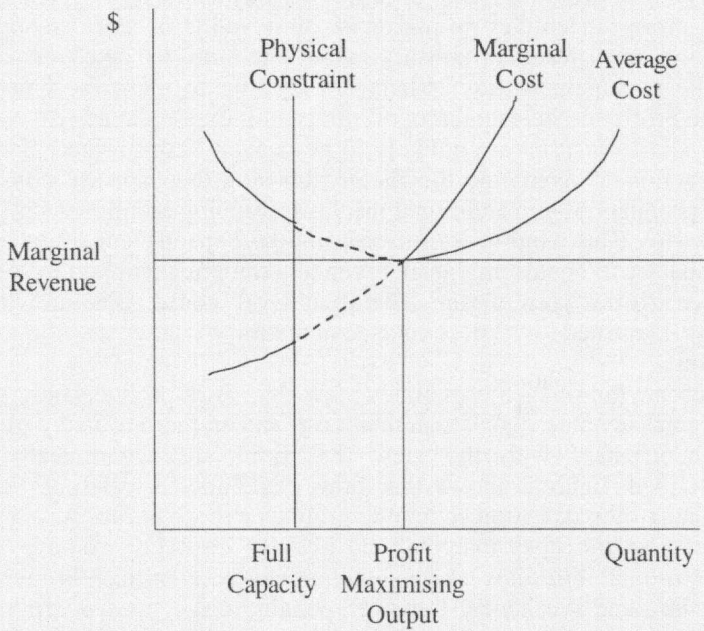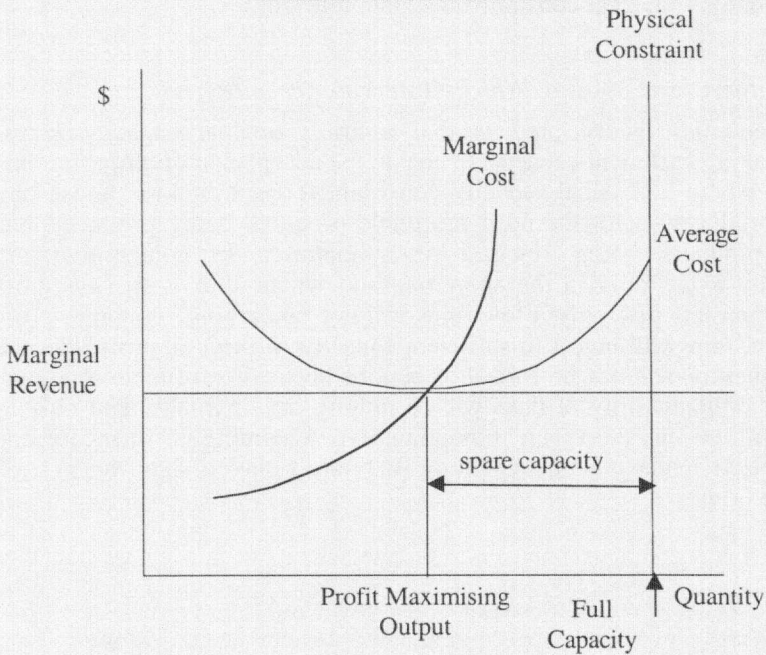
Figure 1
Management Accounting View

Figure 2
Finance-Economics View

From a finance-economics perspective, figure 1 reflects a suboptimal investment decision, and consequently a suboptimal value of the firm. It is unlikely that a firm would continually reject profitable sales because of a physical capacity constraint. Managers have strong incentives to maximise firm value because suboptimal investment decisions may result in nonsurvival of the firm, its takeover, or the replacement of the management team. Managers seeking to maximise firm value will recognise the profitable investment opportunity to increase capacity.

Even in the short run firms are unlikely to be capacity constrained since the firm would take action to overcome the factor imposing the capacity constraint (e.g. subcontract production, hire additional machines, employ additional staff, rent warehouse space, etc). This would result in shifting the capacity constraint to the right until marginal cost equals marginal revenue—the minimum point on the average cost curve. At this point, figure 1's output level would coincide with the level of output identified by the finance-economics view as the profit maximisation point.

Figure 2 presents the finance-economics view that firms produce only to the point where marginal revenue equals marginal cost, and in fact are likely to have spare capacity. Consistent with the view that firms are economically (not physically) constrained, figure 2 shows that firms could increase output beyond the profit maximising output, but on economic grounds choose not to. As the level of output increases, so too does marginal and average cost. For example, many firms work an eight-hour shift on weekdays. Output can be significantly increased by working overtime and weekends, however penalty wage rates contribute to the upward sloping marginal cost curve. Firms reach a point where the marginal cost of further increasing production exceeds the marginal revenue—production beyond the profit maximising point is uneconomic. Accordingly, finance-economics theory predicts that firms are subject to economic constraints which apply well before physical constraints become relevant.

4.2 Algorithms for Choosing Which Orders to Accept/Reject

Finance-economics theory predicts that a firm's optimal capacity investment results in having sufficient capacity to enable the acceptance of all profitable sales. A situation where a physical capacity constraint forces a firm to choose between profitable products—with the most profitable products being produced and less profitable products being rejected—is suboptimal. In competitive markets, suboptimality exists only in the short run, and where that is the case, finance-economics predicts that only a few firms will not be earning economic profits. In the long run, firms will invest in sufficient capacity to meet all profitable demand, and consequently will not be forced to choose between profitable products. It is predicted that the majority of firms will be in long run optimality and only a small minority will be in short run suboptimality. Accordingly, finance-economics predicts that the management accounting literature's choice algorithm is irrelevant in the real world.

4.3   Spare Capacity and Special Order Pricing

The management accounting literature on special order pricing is challenged by finance-economics on two grounds. First, competitive market theory predicts that prices are set by the forces of supply and demand, and all firms price at the market price. To price below market price is suboptimal since this fails to maximise profits. Accordingly, economic theory contradicts the management accounting view that firms price special orders below market price. While firms do on occasions reduce prices, it would be incorrect to attribute this to below-market pricing. Instead, it is likely that the price reduction is due to an increase in supply (reduction in costs) or a decrease in demand. The idea that a firm in a competitive industry prices special orders below market price is denied by competitive market theory, and therefore finance-economics predicts that the accounting literature's framework for special order pricing is irrelevant in practice.

Secondly, in demonstrating the profitability of special orders, the management accounting literature generally fails to recognise that the consequence of returning the firm to full capacity is the subsequent rejection of profitable products. Failure to recognise this opportunity cost results in literature examples superficially appearing profitable. Finance-economics theory predicts that firms in practice would realise that the acceptance of special orders at reduced prices leads to the firm's rejection of other full price business. Accordingly finance-economics predicts that firms in competitive industries do not pursue full capacity by accepting special orders at below market prices.

It is the management accounting view of constant variable costs per unit that results in a prediction that firms will expand production by accepting special orders until they are at full capacity. Consequently, as a result of these special order pricing decisions firms will be at full capacity most of the time. In contrast, cost behaviour according to finance-economics leads to the expectation that firms will not produce at full-capacity. Increasing marginal costs will result in the rejection of unprofitable special orders, and consequently it will be optimal for firms to have spare capacity. Further, rather than accepting special orders below normal prices firms will require higher than normal prices to compensate for increasing costs. Banker et al. (1988, p. 173) demonstrate that costs increase as capacity is utilised:

> We formally prove that the expected lead time and work-in-process carrying costs increase at an increasing rate when expected capacity utilization increases.

4.4   Short Run and Long Run Perspectives

It may be argued that the two views can be reconciled simply by considering the management accounting view (firms face physical capacity constraints) as a short run view, and the finance view (firms have spare capacity) as a long run view. For example, Raiborn et al. (1993, p. 722) highlights the distinction between the short and long term:

> Managers are frequently confronted with the **short run** problem of making the best use of scarce resources that are essential to production activity, but are available only in limited quantity…Management may, in the **long run**, desire and be able to obtain a greater abundance of a scarce resource. For

> instance, additional machines could be purchased to increase availability of machine hours. However, in the **short run**, management must make the best current use of the scarce resources it has. (emphasis added)

Finance theory identifies the investment decision as the decision which determines the value of the firm. This involves prediction of, and planning for, increases in customer demand so that the firm has sufficient capacity in the short run (as well as in the long run) to supply that demand. Maximising firm value requires consideration of both long run and short run factors.

If firms are rejecting profitable sales because of short run constraints on capacity, this indicates that their long run planning was inadequate. They have failed to forecast the increase in demand and acquire the additional capacity necessary to supply that demand. While this may occur in a few firms, it is unlikely that the majority of firms would suffer from insufficient capacity. As the investment decision is the most important decision facing the firm, it is expected that firms give it full consideration and that surviving firms do not suffer from a shortage of capacity in either the short run or the long run. Firms regularly assess customer demand and adjust capacity before capacity shortages become a problem. Only in very rare cases would a windfall demand so unexpected occur that the firm is unable to cope, and even here firms can adjust by hiring equipment, subcontracting, increasing overtime, extending leadtimes, etc. In general, however, it is unlikely that firms would be unprepared for future demand.

In summary, conventional management accounting wisdom regarding capacity constraints does not stand up to theoretical scrutiny from a finance-economics perspective. A more objective conclusion, however, can be drawn by subjecting the two views to empirical testing. The next section of this paper describes the results of empirical research conducted into the capacity constraints of a broad cross section of Australian manufacturing firms.

5.   Empirical Research and Results

5.1   Research Method

Data was collected through a questionnaire survey which was pilot tested on 30 randomly selected firms. The survey sample consisted of 957 Australian manufacturing firms. Usable responses were received from 210 firms, a response rate of 22%.

The survey respondents covered a wide range of industries, geographic locations and firm sizes. The respondent sample is representative (at the 0.1 level of confidence) of the surveyed firms in terms of their geographical distribution and industry classification.

The questionnaire was administered in December 1994, 14 quarters after the end of the 1990/1991 recession. This was a time when the economy had returned to normal economic activity, thus the results of the survey are not biased but are representative of typical economic conditions.

5.2 Survey Results

5.2.1 Capacity Utilisation While the management accounting literature identifies various factors which may constrain production (including labour, machine time, and floor space), these constraints can be relaxed by working the resource for a longer period of time. Accordingly, this paper uses time-worked as a proxy for capacity utilisation. Table 1 reports the average hours worked on week days and on weekends, during both busy and non-busy periods.

Table 1
Average Capacity Utilisation

Firm Size (annual sales)	Average Hours Worked per Day						Length of Busy Period (Months)	Capacity Utilisation (%)
	Busy Period			Non-busy Period				
	Mon–Fri	Sat	Sun	Mon–Fri	Sat	Sun		
Less than $250,000	8.9	3.1	1.2	8.3	2.0	0.2	9.5	34%
$250,000-$500,000	10.4	3.1	1.9	8.8	0.9	0.4	9.3	39%
$500,000-$1m	9.6	2.7	0.9	8.4	0.7	0.4	8.0	35%
$1m-$2m	10.9	5.8	1.5	9.2	1.7	0.0	7.8	41%
$2m-$5m	11.7	4.4	2.0	9.8	2.0	1.6	8.9	44%
$5m-$10m	11.4	5.6	0.9	9.4	0.4	0.0	8.6	42%
$10m-$25m	12.5	5.1	1.1	9.4	0.3	0.0	6.9	43%
Over $25m	16.8	10.0	7.0	13.0	3.8	1.8	8.0	65%
All responding firms	12.1	5.5	2.5	9.9	1.6	0.7	8.3	45%

The responses contradict the management accounting view that physical capacity constraints typically exist. Respondent firms indicate they are not working at full capacity, and that significant spare capacity is the norm.

As a measure of average capacity utilisation over a full year, table 1 presents a *Capacity Utilisation Percentage* (CU%). For the purpose of calculation, 'full capacity' is defined as 140 hours per week (20 hours per day × 7 days).[9] For example, the average CU% for all responding firms is calculated:

$$CU\% = \frac{\left[(12.1 \times 5 \ days) + 5.5 + 2.5\right]\left(\frac{8.3 \ mths}{12 \ mths}\right) + \left[(9.9 \times 5 \ days) + 1.6 + 0.7\right]\left(\frac{12 - 8.3 \ mths}{12 \ mths}\right)}{140 \ hours \ per \ week}$$

$$= 45\%$$

The average firm is utilising only 45% of its full capacity. Capacity utilisation increases with firm size, largely due to the extra hours large firms work on weekends.

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9. This definition of full capacity is consistent with the management accounting literature's 'practical attainable capacity'. Firms would work 140 hours a week if that level of output was economically profitable. Some may argue that 140 hour per week is an overstatement of full capacity. However, the coding of survey data on capacity usage also erred on the side of overstatement. For example, a response of '3–4 hours' was taken to be 4 hours.

Table 2 reports an additional test of capacity usage. As predicted by the finance-economics view, 94.3% of firms 'never' or 'rarely' lose business because of physical capacity constraints (table 2, Panel A). Firms faced with increases in customer orders will not turn away profitable business (in finance terms, they will not reject positive NPV projects). Rather, they will take steps to meet the increased demand. The techniques most frequently used by firms to meet this increased demand are identified in table 2, Panel B.

Table 2

Panel A	Frequency of Customers Being Turned Away Due to Physical Capacity Constraints	
Never		40.0%
Rarely		54.3%
Frequently		5.7%
Most of the Time		0.0%
Panel B	**Methods Used to Meet Significant Increases in Customer Orders[1]**	
Work overtime or additional shifts		77.3%
Prioritise work		46.0%
Extend the lead time		31.3%
Reduce inventory levels		13.6%
Obtain additional equipment		6.6%
Other		4.5%

Note: 1. Percentages add to more than 100% because some firms use several methods of meeting increases in customer orders.

Of the 5.7% of respondents which indicated they 'frequently' rejected sales, half of these maintained that this was a result of a physical capacity constraint.[10] While the finance-economics view predicts firms will invest in sufficient capacity to meet all profitable sales, it is possible that in the short run some firms—due to either poor planning or unexpected high demand—will experience a shortage of capacity. Consequently, it is expected that these firms will take whatever action is necessary to avoid a recurrence of lost business. Table 3 reports the action taken by firms who had previously lost business because of physical capacity constraints.

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10. 5.7% of respondent firms consists of 12 firms. Therefore, only six of these respondents indicated the rejection of business was due to physical capacity constraints.

Table 3

Action Taken to Overcome Problem of Having to Turn Away Business

Increased capacity by obtaining additional equipment	67%
Increased staffing	33%
Added a shift	33%
Identified subcontractors to use in busy periods	33%
Decided to work overtime in busy periods	17%
Other	33%

Finally, the survey results indicate that no firms follow the choice algorithms advocated by the management accounting literature (maximising the contribution margin per unit of the limiting factor, linear programming techniques, etc).

5.2.2   The Investment Decision   Section 4 predicted that firms seeking to maximise their value will not reject profitable sales. Accordingly, it is expected that managers plan for future demand, and forecasts of increased demand are reflected in investment decisions for additional capacity. Table 4 Panel A reports that 54.8% of responding firms prepare *formal* capital expenditure budgets for at least 12 months ahead. The frequency of such budgets increases with firm size.

The fact that larger firms are more likely to prepare formal capital expenditure budgets does not necessarily mean that smaller firms do not budget adequately. In a competitive environment, it is expected that the planning process is as crucial for small firms as for large ones. Small firms must also monitor the adequacy of existing capacity to meet future demand. However, it is likely that their 'capital budgeting' is less formal. Table 4 Panel B reports the activities undertaken by respondent firms who do not prepare formal capital expenditure budgets. The survey results support the finance-economics view that the investment decision is the critical decision for all firms.

5.2.3   Economic Factors Constrain Output   Finance-economics theory predicts that firms are economically constrained, and in fact, are likely to have spare physical capacity. The management accounting view depicted in figure 1, where profitable sales are rejected because of a physical constraint, is suboptimal and is not supported by the empirical results. In response to a question regarding the firm's actions in the event of a significant increase in orders, 97.6% of respondents indicated that they do not normally reject customers, and of the small number of firms that had rejected customers (even in the presence of idle capacity), 80% of them did so because the cost of obtaining additional labour (casual, overtime) was prohibitive. This supports the finance-economics view that firms are economically, not physically, constrained.

Table 4

Panel A   Percentage of Firms that Prepare Formal Capital Expenditure Budgets

Firm Size (Annual Sales)	
Less than $250,000	17.6%
$250,000–$500,000	23.5%
$500,000–$1m	23.3%
$1m–$2m	46.2%
$2m–$5m	48.3%
$5m–$10m	56.5%
$10m–$25m	80.0%
Over $25m	100.0%
All responding firms	54.8%

Panel B   Activities Undertaken by Firms Which Do Not Prepare Formal Capital Expenditure Budgets

Monitor whether existing staff levels are sufficient for the expected volume of demand	75.3%
Monitor whether existing equipment can meet the expected volume of demand	74.2%
Monitor the types of products demanded by customers to ensure the appropriate equipment is available when required	52.7%
Monitor new equipment as it becomes available	38.7%

The average capacity utilisation of respondent firms (table 1) is well below full capacity. While firms could increase production output to utilise spare capacity, the finance-economics view predicts that spare capacity is optimal for firms. Table 5 reports the reasons given by respondent firms for not utilising their full physical capacity. Economic factors are prevalent.

Table 5
Reasons for Not Utilising Full Physical Capacity

Costs of significantly increasing production are too high	51.6%
To increase market share, prices would have to be set below cost	29.7%
At current market price, could not sell additional output	28.1%
Attempts to increase market share causes retaliatory action by competitors	13.0%
Other	24.5%

5.2.4   Special Order Pricing   The empirical results of this paper support the view that firms do not operate at full capacity. If spare capacity is the norm, there is no reason to price special one-off orders at a price below market price. Table 6 Panel A reports the method used by respondent firms to determine selling price. A normal markup with necessary reductions to meet competition (that is, market price) is used in 78% of cases. Panel B of table 6 specifically addresses the frequency of one-off sales to non-regular customers at prices lower than regular. A total of 84.7% of respondent firms 'never' or 'rarely' depart from market prices for special orders.

Table 6

Panel A   Method of Determining Selling Prices

Normal markup with necessary reductions to meet competition	78.0%
Normal markup for all customers	16.3%
Other	5.7%

Panel B   Frequency of One-Off Sales to Non-Regular Customers at Prices Lower than Normal

Never	55.5%
Rarely	29.2%
Sometimes	14.4%
Frequently	1.0%

6.   Conclusion

This paper examines the widespread view of the management accounting literature that firms are subject to physical capacity constraints and normally operate at full capacity. This proposition has implications for firms' production decisions, and the pricing of one-off special orders.

When scrutinised from the perspective of the finance-economics literature, the management accounting view represents a suboptimal situation. An insufficient investment in physical capacity which results in rejection of profitable sales means the value of the firm is not maximised. It is unlikely that this situation is the norm in practice. The investment decision is the crucial determinant of a firm's value and it is expected that firms plan for sufficient capacity to be available to meet all profitable demand.

The empirical results of this paper support the finance-economics view. Australian manufacturing firms pay particular attention to the adequacy of their productive capacity to meet expected future demand. Accordingly, firms rarely reject customer orders and in fact have significant spare capacity. The relatively low level of capacity utilisation reported in this paper suggests that firms are subject to economic constraints which apply well before physical capacity constraints become relevant.

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