THE DIRECTION OF AUSTRALIAN INVESTMENT
FROM 1985/86 TO 1988/89

Christopher Kent and Patricia Scott

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ABSTRACT

Using unpublished data at a disaggregated level, this paper provides a detailed picture of the direction of investment over the 1985/86 to 1988/89 investment boom. Most of the growth in non-farm capital expenditure has been concentrated in a few industries, in particular, office construction. We also calculate an improved measure of the proportion of manufacturing investment which was directed towards tradeable capacity. This shows a modest rise in the latter part of the period studied.

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1. INTRODUCTION

This paper uses unpublished data to examine the direction of domestic investment during the investment boom that occurred between 1985/86 and 1988/89.

The direction of investment is briefly discussed using aggregate data for the period 1985/86 to 1988/89 in Section 2. Section 3 identifies those industries that contributed most to the investment boom, but unlike earlier papers does so at the individual industry level by using unpublished investment data. We show that the investment boom from 1985/86 to 1988/89 was not as broadly based as previously published data had suggested; in fact 10 out of the total 59 industries accounted for just over three-quarters of the growth in investment over this period. Over one-quarter of the growth in real investment over the period 1985/86 to 1988/89 was carried out by the sector classified as "real estate operators and developers". Hence Section 4 is devoted to a discussion of this investment.

Section 5 provides a review of recent Australian literature, in particular, studies by Treasury (1988, 1989 and 1990), the Bureau of Industry Economics (1990) and Wood, Lewis and Petridis (1990), which provide often-conflicting evidence on the allocation of investment between the tradeable and non-tradeable sectors. The final section of the paper looks at the share of **manufacturing** investment that went into the tradeable and non-tradeable sectors (data limitations force us to confine ourselves to an investigation of the manufacturing sector only). Results using our preferred methodology show a modest rise in the share of manufacturing investment going to tradeable capacity in the latter part of the period studied. This increase came entirely from an increase in the proportion of total manufacturing investment in import replacement capacity. The absence of any sign of a shift in the share of capital going into export-creating capacity and the rise

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in the share going into import-replacement capacity may reflect the lagged response of manufacturers to changes in relative prices.

2. AGGREGATE DATA TRENDS

In constant price terms, the surge in business fixed investment over 1985/86 to 1988/89 represents the most significant boom in the last 30 years (Graph 1). In current price terms this growth in business fixed investment is not as significant, with investment in equipment growing more slowly in current price terms over this period (Graph 2).[1]

National Accounts data[2] suggests that over the four years to 1988/89 real business fixed investment grew at an average annual rate of 8.5 per cent compared to an average fall of 0.3 per cent per annum for the preceding four years. Within the total, expenditure on equipment rose by an average of 7.7 per cent per annum while expenditure on non-dwelling construction rose by an average of 10.1 per cent per annum. From 1988/89 to 1989/90 real business fixed investment fell by 0.3 per cent.

There is another source of information on investment - the Capital Expenditure Survey (CAPEX). At the disaggregated level, results from this survey have been shown to be more accurate than the National Accounts capital stock estimates (Lattimore (1989 and 1990)).[3] This survey has a narrower coverage than the National Accounts data, primarily because it excludes rural and community services investment.[4]

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[1] For a discussion of the estimated price series used by the ABS to deflate computer imports (which takes into account increases in the technical capacity of computers), see McCarthy (1989).
[2] Australian Bureau of Statistics (1990a), Cat. no. 5206.0.
[3] The disparities in the National Accounts data are thought to be largely due to errors in classifying investment by units using taxation data.
[4] When we compiled our data base the construction industry was also excluded from CAPEX. Although this industry has since been included in published CAPEX data, we elected to ignore this industry's relatively small investment. In 1988/89 total investment by the construction industry was 4.0 per cent of total CAPEX, while building and structures investment by the construction industry was only 2.7 per cent of total building and structures investment covered by CAPEX.
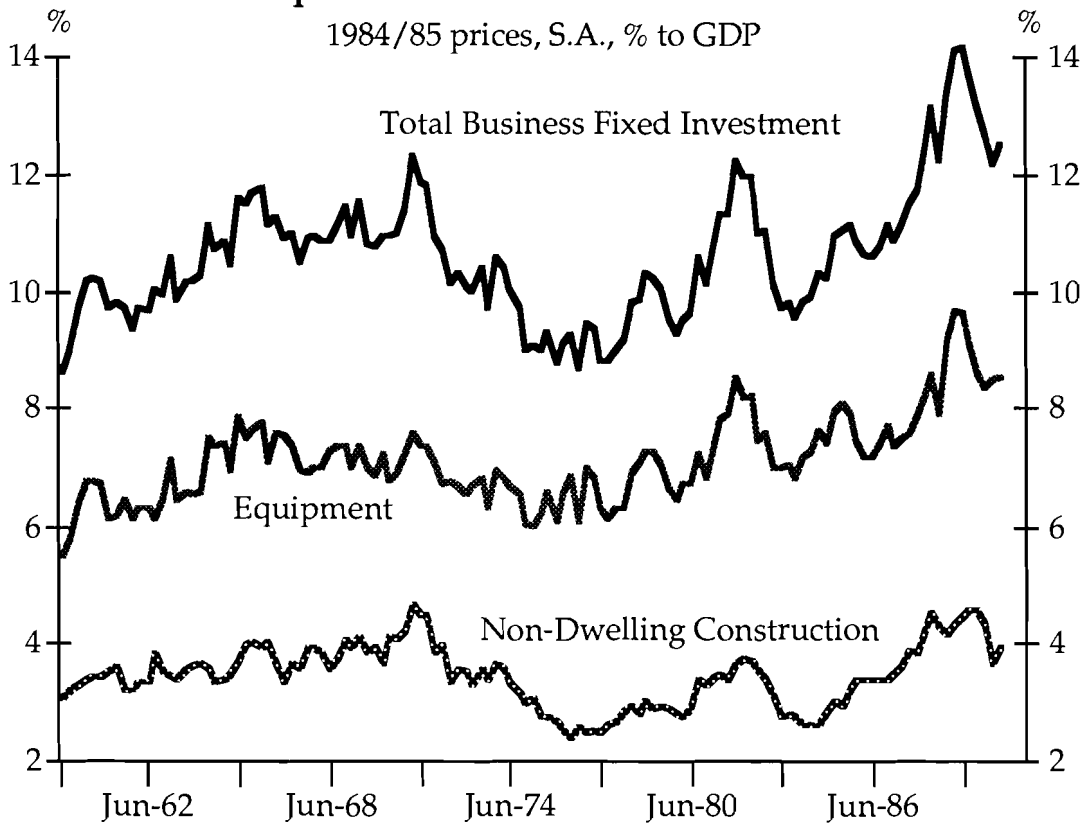
Capital expenditure survey data show that during the period 1985/86 to 1988/89, growth in real new private capital expenditure in the non-rural sectors averaged 10.8 per cent per annum. Growth in expenditure on plant and equipment rose by 9.5 per cent per annum while expenditure on building and structures averaged 13.5 per cent per annum. From 1988/89 to 1989/90 real new private capital expenditure fell by 1.7 per cent.

Over the period 1985/86 to 1988/89 the finance sector accounted for 47.1 per cent of the growth in private investment captured by the CAPEX survey, manufacturing contributed 27.0 per cent, mining 10.2 per cent and "other selected industries" 15.7 per cent.[5] The "other selected industries" sector had the highest share in total CAPEX in 1985/86 (35.1 per cent) and the mining sector had the lowest share for the same year (15.6 per cent). However, the finance sector experienced the largest growth in investment between 1985/86 and 1988/89 (79.1 per cent), while "other selected industries" recorded the lowest growth in investment over the same period (15.7 per cent). At this level of disaggregation the investment boom appears to have been broadly based (Graph 3). However, the results that follow show that growth in investment was concentrated in a few industries.

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[5] "Other selected industries" sector includes electricity, gas, sewerage, wholesale, retail, transport, communication, entertainment, restaurant and hotel industries (see Appendix 1).

Graph 1: Business Fixed Investment

1984/85 prices, S.A., % to GDP

Total Business Fixed Investment

Equipment

Non-Dwelling Construction

Graph 2: Business Fixed Investment

current prices, S.A., % to GDP

Total Business Fixed Investment

Equipment

Non-Dwelling Construction

Graph 3: Private New Capital Expenditure
1984/85 prices, S. A.
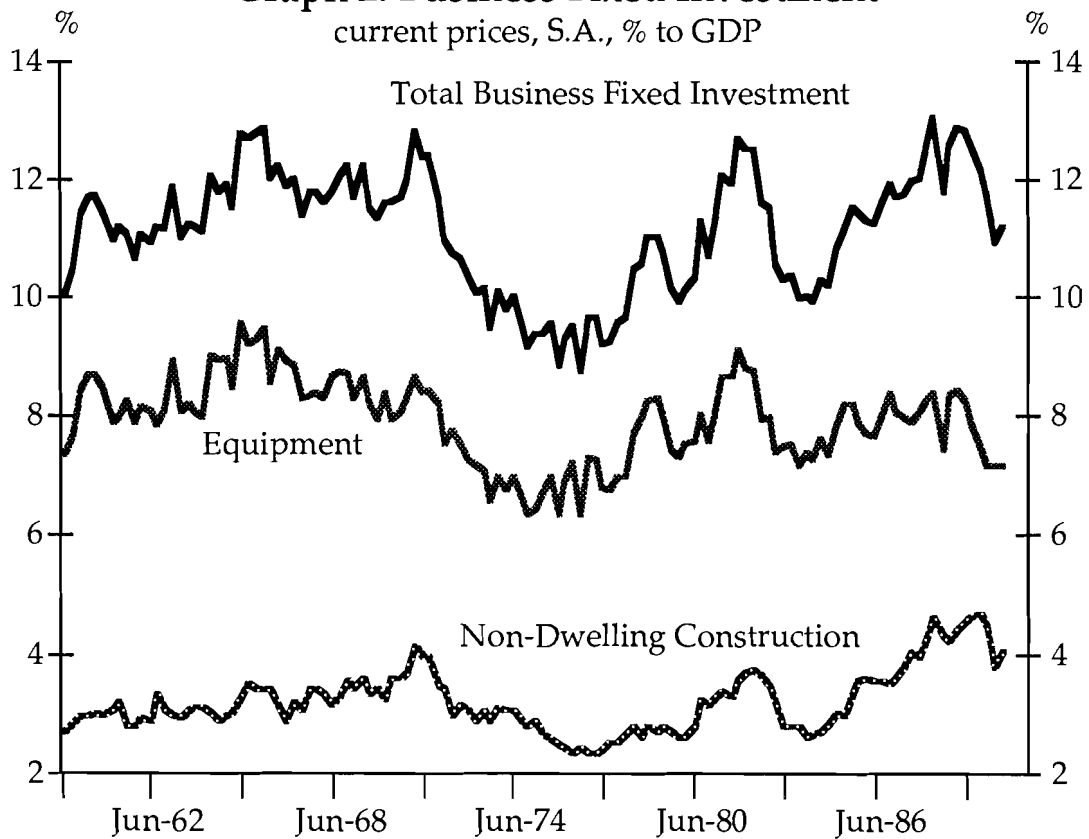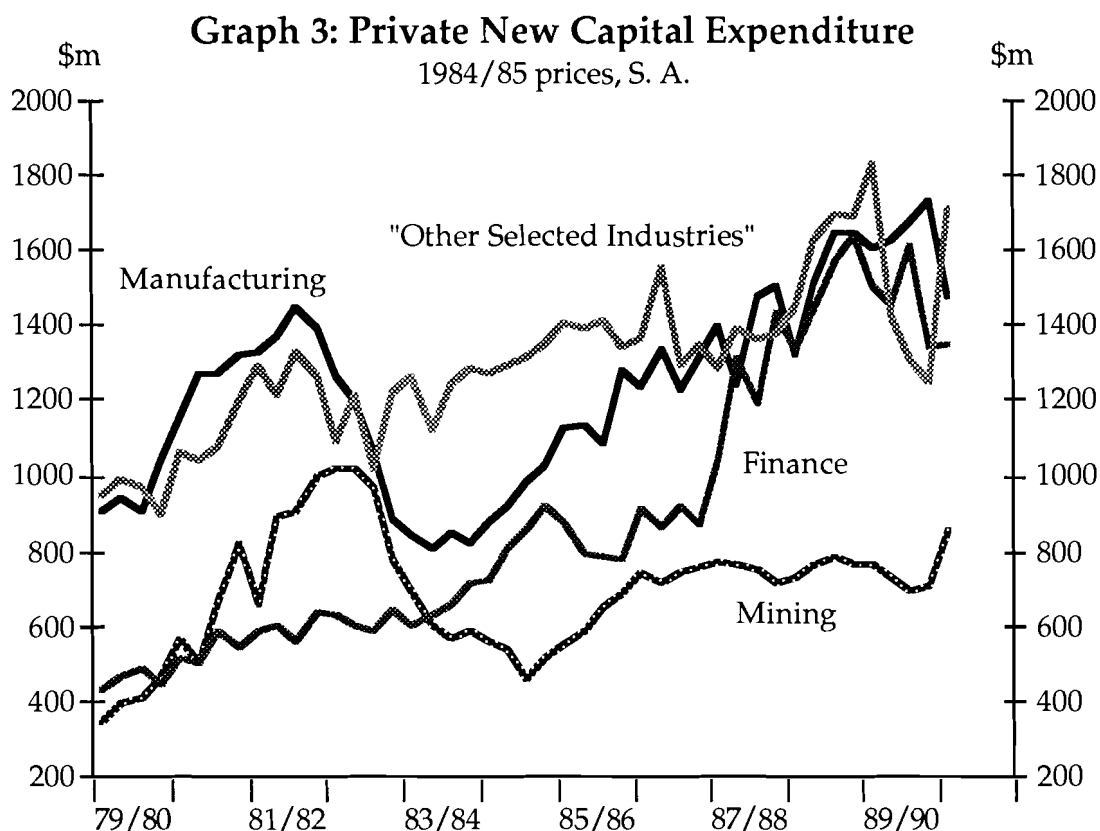
3. DISAGGREGATED RESULTS

The CAPEX survey covers approximately 8,200 private businesses (or 1.6 per cent of the total number of private businesses represented by the survey) and is supplemented by data on management units outside the sample which have large capital expenditure. Investment is classified by its final form, that is, into investment in building and structures or plant and equipment. It is also classified on the basis of the output of the individual production unit according to the Australian Standard Industrial Classification 1983 (ABS (1985)). Since 1985, the Australian Bureau of Statistics has allocated capital expenditure by user rather than owner in order to avoid the problems created by finance leases where the user is not the owner.[6] However, capital expenditure is allocated by owner where

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6 The ABS define a finance lease/leveraged lease as referring to "... those arrangements which effectively transfer from the lessor to the lessee substantially all the risks and benefits incident to ownership. Generally these would be leases which are virtually non-cancellable and/or where legal ownership transfers to the lessee at the end of the lease term." (ABS (1990d), p. 2)

"... expenditure [is] on new tangible assets for rental, hire or lease (operating lease only) to another related or unrelated enterprise." (ABS (1990a), p. 2)

The unpublished data is at a highly disaggregated level, divided into 59 groups called "estimation industries". Our data includes investment in 48 estimation industries, which are listed in Appendix 1. The ABS withheld investment data on six estimation industries to ensure confidentiality[7] and another five industries are excluded as data on the construction industries was considered by the ABS to be unreliable at the time work on this paper began. Despite these exclusions, for the period 1985/86 to 1988/89 we have investment data at the estimation industry level which represents 96.3 per cent of the published CAPEX total (this is an average of the coverage for each year in the period). The percentage contributions to growth in real investment over the period 1985/86 to 1988/89 were calculated for the 48 estimation industries. These calculations are reported in Appendix 1.[8]

Table 1 shows the 10 industries which contributed most to the growth in investment over this period. In total, these ten estimation industries accounted for just over three-quarters of the growth in total real investment between 1985/86 and 1988/89. One estimation industry, real estate operators and developers, accounted for more than one quarter of the total growth, although there is evidence to suggest that some proportion of this investment was replacing investment previously undertaken by other industries (Section 4 deals with this issue).

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[7] Investment data for industries dominated by a few firms (such as air transport, tobacco and rail transport) were withheld by ABS to maintain confidentiality. Other estimation industries are made "consequentially" confidential to prevent investment in confidential estimation industries being derived using published CAPEX sector totals.

[8] Estimation industry contributions are to the growth in total real private new capital expenditure published in the CAPEX survey. The contributions reported in Appendix 1 do not sum to 100 per cent due to the exclusion of some industries to ensure confidentiality and/or to revisions in the CAPEX total which are not recorded at the estimation industry level.

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Table 1: The Top Ten Contributions to Growth in Real Total Private Non-Rural Investment between 1985/86 and 1988/89

Rank	Estimation Industry	% contribution to growth in real total private non-rural investment
1	real estate operators & developers	27.5
2	mining metallic minerals	13.5
3	insurance (which includes superannuation funds)	7.2
4	finance includes all bank, non-bank financial institutions, stock exchanges and services to finance and investment	6.1
5	other property & business services (including plant hire and leasing)	5.2
6	manufacturing basic chemicals	4.7
7	food, milk & bread vendors	4.0
8	manufacturing paper and paper products	3.9
9	manufacturing non-metallic mineral products	3.1
10	manufacturing fabricated metal products	2.3

Table 2 shows the other side of the story - the five industries which made the largest negative contributions to growth in capital expenditure.

Table 2: Largest Detractions from Growth in Real Total Private Non-Rural Investment between 1985/86 and 1988/89

Rank	Estimation Industry	% contribution to growth in real total private non-rural investment
1	mining coal, oil and gas, construction materials and services to mining including mineral exploration	-3.5
2	transport and storage including road, air & rail. Includes pipeline operations, travel agency services, grain storage etc	-3.2
3	manufacturing basic iron & steel	-3.0
4	new motor vehicle dealers, motor cycle dealers etc	-2.7
5	road freight transport, including long distance interstate road freight transport and intrastate and short distance road freight	-1.7

The estimation industry shares in total CAPEX in 1985/86 ranged up to 11.4 per cent for estimation industry number 2 - mining coal, oil and gas - though only 7 of the estimation industries had shares greater than 3 per cent. The growth in investment levels from 1985/86 to 1988/89 ranged from -59.4 per cent up to 467.0 per cent (see Appendix 1); the total CAPEX grew by 36.0 per cent over the same period. Thus there were wide divergences in growth rates of investment in different industries, and the industries contributing the most to total growth in investment were often not especially large industries with regard to investment shares in the base year, 1985/86.
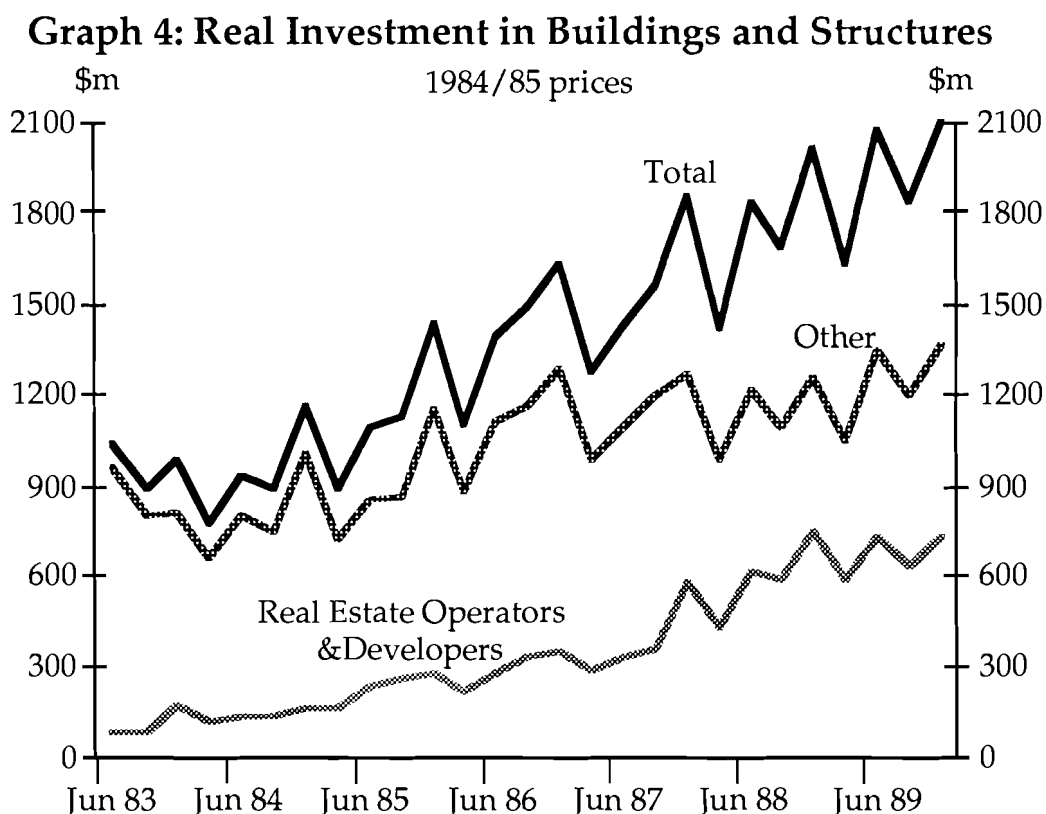
4. INVESTMENT BY REAL ESTATE OPERATORS AND DEVELOPERS

Based on the CAPEX survey, real new private capital expenditure in 1988/89 was $5.7 billion higher than in 1985/86 (1984/85 prices). Real estate operators and developers accounted for 27.5 per cent of this extra $5.7 billion, with their investment rising from $1.1 billion in 1985/86 (just over 7 per cent of total private new capital expenditure) to $2.7 billion in 1988/89 (about 12.5 per cent of total private new capital expenditure).

Most of this industry's growth is, not surprisingly, concentrated in building and structures. This industry is involved in the organisation of land and property developments and **not** the actual purchase or clearing of land, nor the provision of services to subdivisions or the construction of dwellings. It consists of establishments mainly engaged in renting or leasing their own non-residential properties to others. It also includes establishments mainly engaged in land subdivision or development, but **not** its construction.

The fact that real estate operators and developers accounted for so much of the growth in real capital expenditure over this period may simply reflect a trend in the commercial property market, away from the end users owning premises they occupy to the end users increasingly renting their premises. For example, a number of the large chain stores and private banks now lease their suburban premises rather than investing capital in their premises. Recall that while the ABS now allocates investment to the user rather than the owner, this does not apply to the rental of commercial property. This is because commercial property is generally rented out under standard or operating leases.

We found evidence consistent with the hypothesis that the spectacular growth in investment by real estate operators and developers was simply replacing investment formerly undertaken by other industries. Graph 4 appears to show a rise above trend following 1987 in the level of building and structures investment by real estate operators and developers. The trend for total building and structures investment appears unchanged while

the building and structures investment by other industries falls below trend.[9]

Graph 4: Real Investment in Buildings and Structures

Having established that the level of total building and structures investment did not rise above its trend but that this investment was increasingly carried out by real estate operators and developers, it is of interest whether the end use of investment has altered. The ABS carries out a survey of the value of building investment which provides a breakdown of building activity into various structural types (shops, offices, hotels, etc).

Graph 5 shows the breakdown in the real value of completed non-residential private sector construction. The share of building investment going to offices rose from 32 per cent in September 1987 (when building and structures investment by real estate operators and developers begins to grow more rapidly) to an average of 35 per cent in 1988/89. In the September quarter 1989 office construction accounted for 38 per cent of the

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[9] Various econometric tests were carried out by estimating models of the three series in Graph 4. The models were based on linear time trends, lagged dependents and seasonal dummies and were found to be significant, thus supporting these conclusions. Details of the estimated models are available on request.

volume of non-dwelling construction. Office construction made the largest contribution to growth in the real value of non-residential construction over the period 1985/86 to 1988/89 (45 per cent). The 1990 Budget Papers indicate that the real value of office construction in the most recent investment boom as a proportion of GDP exceeded that of the booms in late 1960s and early 1970s. It is perhaps not a coincidence that asset prices for commercial properties appear to have peaked and vacancy rates are increasing (JLW 1990, Treasury 1990, The Australian 1.8.90, BIS Shrapnel 1990).

Graph 5: Non-Dwelling Construction
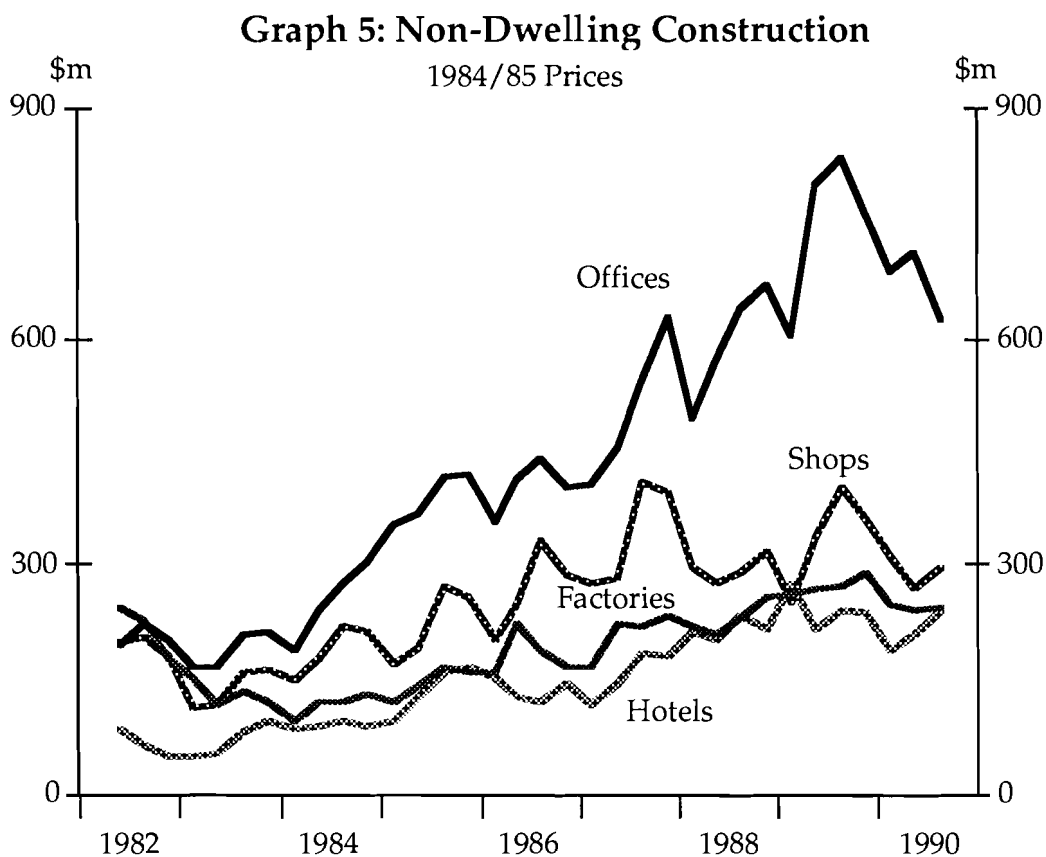
5. PREVIOUS FINDINGS ON THE TRADEABLE/NON-TRADEABLE INVESTMENT MIX

In recent Australian studies on the direction of investment, the delineation of industries as either tradeable or non-tradeable ranges from identification at an aggregated level (Treasury (1987, 1988, 1989 and 1990)), to quantitative analysis of the tradeability of individual industries (Wood, Lewis and Petridis (1990), and the Bureau of Industry Economics (1990)).

Having determined the tradeability or otherwise of an industry/sector, Treasury (1987, 1988, 1989 and 1990) and the BIE (1990) go on to attribute all of that industry's/sector's investment as either tradeable or non-tradeable investment. Wood, Lewis and Petridis (1990) use export propensities to calculate how much investment in any one industry is directly attributable to creating export capacity.

(a) Treasury

Using aggregated data the Treasury have calculated the level of investment in the tradeable sector. Treasury classified mining, manufacturing and "other non-manufacturing industries" as tradeable. "Other non-manufacturing industries", which includes entertainment, recreation, hotels and personal service industries, was classified as tradeable on the basis of increased numbers of foreign tourists visiting Australia. The finance, property and business services sectors and all other service sectors were classified as non-tradeable.

Using published CAPEX data, Treasury's 1989 budget analysis concluded that a sharp lift in investment occurred in tradeable industries over 1985 and 1986, following the depreciation of the Australian dollar in 1985, but that this share had tapered-off in more recent years. Treasury identified investment in non-commodity tradeables - notably tourism - as the fastest growing sector since 1982/83. In the 1990 Budget papers the Treasury provided figures which showed that over the two years to 1988/89 business fixed capital stock in the non-tradeable sector had grown at a faster rate than growth in the tradeable sector's capital stock.

(b) Bureau of Industry Economics

The BIE (1990) investigated the share of tradeable investment in the manufacturing sector using unpublished data on investment in 28 manufacturing groups and trade data (mostly at the ASIC 3 digit level).[10] To assess whether an industry was tradeable or non-tradeable the BIE

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[10] The BIE derived a capital stock series based on the Manufacturing Census carried out by the ABS. See Karpouzis and Offner (1983) for a discussion of the creation of this series.

(1990) calculated import penetration ratios and export propensities. The export propensity (e) was defined as

$$e = \frac{X}{S}$$

where X is the volume of exports for a particular industry; and
S is the volume of domestic manufacturers' sales.

The import propensity (m) was the ratio of the volume of imports (M) to the volume of total domestic consumption. Total domestic consumption is equal to the sum of domestic manufacturers' sales plus imports less exports.[11]

$$m = \frac{M}{S + M - X}$$

An industry was classified as an import competing industry if its import penetration ratio was greater than 10 per cent and export propensity less than 10 per cent. Export industries had export propensities greater than 10 per cent and import penetration ratios less than 10 per cent. Non-traded industries had both ratios less than 10 per cent. Industries with both import and export ratios greater than 10 per cent were classified as intra-industry trade industries.

The BIE (1990) found that there had been no change in the share of investment in the manufacturing sector going into tradeables industries, although within the tradeables sector the relative shares going to export, import and intra-trade industries did change. Between 1984/85 and 1987/88 the share of investment going into import competing industries rose by 9 percentage points. This rise was offset by a fall in the share of investment going into export industries and intra-industry trade industries. There was a slight tendency for industries with high import penetration ratios to have recorded a faster rate of growth in investment than industries with lower import propensities. Overall they concluded that there was no clear relationship between increased investment and import substitution or export growth.

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[11] No adjustment was made for stocks.

(c) Wood, Lewis and Petridis

The Wood, Lewis and Petridis (1990) study over the period 1980/81 to 1987/88 involved weighting the sum of capital expenditure figures for investment in eight broad **manufacturing** subdivisions by export propensities. Wood et al. (1990) assume that manufacturing industries have the same capital to output ratio in production for domestic and export markets. They are thus able to define investment in export creating capacity (w) as follows:

$$w = \sum_{i=1}^{n} e_i I_i \tag{1}$$

where e_i is exports of industry i / output in industry i;

   I_i is total investment in industry i; and

   n is the number of industries in the survey.

For the manufacturing sector as a whole, they found investment in export capacity was pro-cyclical to total manufacturing investment until 1984/85. The proportion of total investment going into export capacity peaked at 25 per cent of total manufacturing investment in 1982/83. By 1984/85 it had declined to 16 per cent, with only a partial recovery after the depreciation of the Australian dollar in 1985. In 1987/88 20 per cent of total manufacturing investment was in export capacity creation. They found no "... sizeable and permanent shift in the pattern of investment toward export creation ..." (Wood et al. (1990), p. 3).

Wood et al. (1990) found an increase in the manufacturing sector's overall propensity to export in the 1980s but with investment concentrated in industries with relatively lower export propensities.[12]

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[12] Totally differentiating (1): $dw = \sum e_i \, dI_i + \sum I_i \, de_i$ (2)

The first term on the right hand side of (2) reflects the export orientation of investment changes. The second term is the change in the export intensity of investment.

6. TRADEABLE AND NON-TRADEABLE INVESTMENT IN THE MANUFACTURING SECTOR

The objective in this section is to obtain a better measure of the level of investment in the tradeable sector over the period of the most recent investment boom. Interest in investment in the tradeable sector derives from the view that meeting the challenge of Australia's external imbalance requires structural change, i.e. it is necessary for manufacturing industries to make new inroads into international export markets and to compete more effectively against imported manufactures. This view implies that the "right" industries for investment to be going towards are those industries which are tradeable.

In principle a tradeable industry is one where a movement in international relative prices favouring its product would see substitution in demand and supply towards producing for export (or import competition). It would be interesting to know whether the sharp fall in Australia's real exchange rate from 1985 was associated with investment in those industries where these price elasticities are greatest. Estimation of the appropriate elasticities at such a disaggregated level over the sample period chosen is not, however, practical. Most of the existing Australian literature in this area, therefore, has adopted the practice of using average (as opposed to marginal) export propensities. This may be a guide to the extent the average share of exports in production or sales of the industry is related to its price responsiveness. While this approach may be imperfect, we nevertheless present results using the methodologies of the Bureau of Industry Economics and an extension of Wood et al. (1990).

The BIE (1990) methodology involves estimating import penetration ratios and export propensities and then using a bench-mark for these ratios to categorise the industry. Where a particular industry is classified as tradeable then the **total** investment of that industry is deemed as tradeable. The BIE approach has two drawbacks. The first of these is that it attributes all the investment as tradeable when a significant proportion of some tradeable industry's output may be neither in the export market nor subject

to import competition.[13] The other drawback is the arbitrary nature of any bench-mark. The methodology of Wood et al. (1990) overcomes these weaknesses but they restricted themselves to an analysis of only export creating investment.

In order to develop our preferred procedure we assume that adjustment can occur on all margins, and not just the trade margin. For exportable industries, investment will lead to the production of units of output, some of which will be consumed domestically and the rest exported; the split will be captured by weighting investment by the export propensity.[14] A similar argument also applies to industries producing importable goods. Output produced by new investment will compete with both imports and existing domestic production. We assume the extent to which output from this new investment will replace imports can best be captured by the import penetration ratio.

Like Wood et al. (1990), we weight investment in each year with the export propensity (or import penetration ratio) of that year and thus neglect dynamic problems associated with lags between when investment is undertaken and when output from this investment is produced.

There is an additional problem due to the degree of aggregation. Using a bench-mark to classify an estimation industry as tradeable or non-tradeable neglects the range of industry types that are aggregated to form this estimation industry. Thus to claim all of the investment within the estimation industry is tradeable or non-tradeable is likely to be incorrect. *A priori* it is not possible to determine the direction of the bias over all estimation industries, though this bias can be minimized by using data at the most disaggregated level possible (as we have done).

The aggregation problem is partially avoided by using our preferred methodology - that is, weighting investment by import penetration ratios and export propensities. The implicit assumption is that the capital to

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[13] While for a domestic industry competing with imports, all units of domestic output are thought of as competing with imports, the issue here is to what extent new investment will reduce imports.

[14] Those units consumed domestically may be as a result of growth in domestic demand and/or crowding out of existing production.

output ratio is constant across all industries within each estimation industry.

(a) Results using the BIE Approach

Export propensities and import penetration ratios for 18 of the 22 **manufacturing** estimation industries were calculated from unpublished ABS trade data at the ASIC 4 digit level. Results are reported in Appendix 2, Tables 6 and 7 respectively.[15] The export propensities and import penetration ratios are those defined by the BIE (1990) as in Section 5(b). The domestic production series is from the ABS Stocks, Manufacturers' Sales and Expected Sales survey.[16]

We classify an industry as tradeable if the appropriate ratio is greater than or equal to the bench-mark for every year of the period studied. We call these the 10-per-cent-every-year and 20-per-cent-every-year bench-marks. Table 3 and Table 4 classify the estimation industries in the manufacturing sector using these bench-marks.

A comparison of Tables 3 and 4 reveals that the traded/non-traded split is surprisingly insensitive to a change in the bench-mark. Only four industries are reclassified from being tradeable industries to non-tradeable industries as we move from the 10 to the 20 per cent bench-mark.

Using either bench-mark, we calculate the proportion of total investment which occurred in those estimation industries defined as export industries and/or import competing industries. This provides two measures of the proportion of total manufacturing investment in the traded sector. Graph 6 shows the results using both bench-marks as well as results using a preferred measure which will be defined in Section 6(b).

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[15] Though we report import penetration ratios and export propensities for the fruit and vegetable products estimation industry (CAPEX 04), no investment data is available for this estimation industry. Thus we also include this estimation industry in the aggregated food and tobacco industry for which investment data is available.

[16] Australian Bureau of Statistics (1990a), Cat. no. 5629.0.

Table 3: Categorisation of Manufacturing Industries by Trade Orientation
using the 10-per-cent-every-year bench-mark

| Non-traded Industries at the 10 per cent bench-mark	Export Industries at the 10 per cent bench-mark	Import Competing Industries at the 10 per cent bench-mark
beverages and malt	food & tobacco	fruit & vegetables
wood and wood products	textiles	textiles
printing and allied industries		clothing and footwear
non-metallic mineral products	chemicals & petroleum	chemicals & petroleum
fabricated metal products	photographic, professional and scientific equipment	photographic, professional and scientific equipment
	non-ferrous metals	industrial machinery & equipment
		other transport equipment
		paper and paper products
		basic iron & steel
		motor vehicles and parts
		appliances & electrical equipment
		misc. manufacturing

Table 4: Categorisation of Manufacturing Industries by Trade Orientation using the 20-per-cent-every-year bench-mark

Non-traded Industries at the 20 per cent bench-mark	Export Industries at the 20 per cent bench-mark	Import Competing Industries at the 20 per cent bench-mark
fruit & vegetable products	textiles	textiles
beverages and malt	photographic, professional and scientific equipment	photographic, professional and scientific equipment
clothing and footwear	food & tobacco	chemicals & petroleum
wood and wood products	non-ferrous metals	motor vehicles and parts
paper and paper products		other transport equipment
printing and allied industries		appliances and electrical equipment
non-metallic minerals		industrial machinery & equipment
basic iron and steel		misc. manufacturing
fabricated metal products		

Graph 6: Proportion of Total Manufacturing Investment in the Tradeable Sector
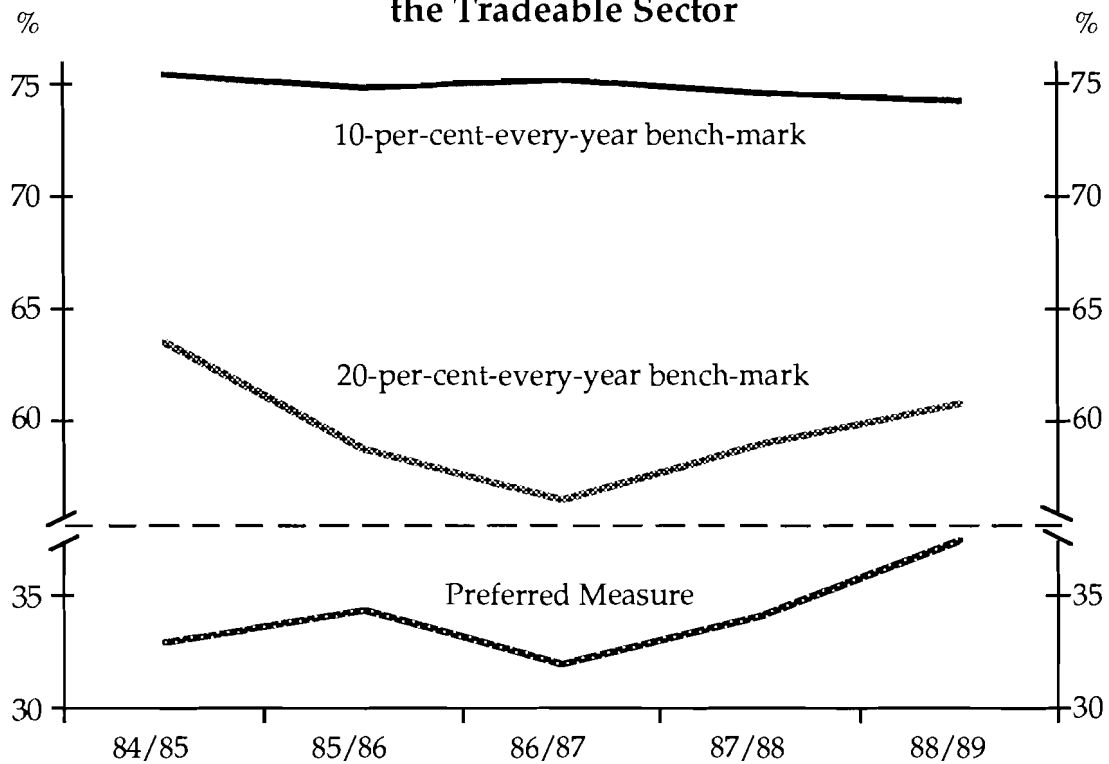
Not surprisingly, the less restrictive the bench-mark the higher the proportion of manufacturing investment in the tradeable sector. Results for the 10 per cent bench-mark show that the proportion of manufacturing investment in the tradeable sector remained almost unchanged over the period. For the 20 per cent bench-mark, the share of manufacturing investment in tradeable industries fell from 1984/85 to 1986/87 then rose through to 1988/89. These results show a small fall in the share of manufacturing investment directed to the tradeable sector over the period 1984/85 to 1988/89 (falls of 1.2 and 2.8 percentage points for the 10 per cent and the 20 per cent bench-marks respectively).[17]

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[17] The BIE apply bench-marks on the basis of the values of penetration ratios and propensities for only one year - 1986/87. Another alternative would be to use averages over the whole period to classify industries. We have established that results for the 10 per cent bench-mark are insensitive to changes in the way the bench-mark is applied. Applying the 20 per cent bench-mark in alternative ways (either to the average of ratios over the whole period or to the 1986/87 ratios) shifts the curve up (by about 7 percentage points) with minimal change to its shape. The 20 per cent bench-mark applied in 1986/87 shows a 1 percentage point rise in the share of manufacturing investment directed to the tradeable sector from 1984/85 to 1988/89.

(b) Results using the Preferred Approach

To derive our preferred measure of the proportion of total manufacturing investment in the tradeable sector we extend the Wood et al. approach by calculating the proportion of total manufacturing investment in import competing investment. However, the definition of trade ratios used by the BIE and Wood et al. (1990) is inappropriate for this application as the import penetration ratio does not share a common denominator with the export propensity.

To determine the tradeability of investment we need to determine what will happen to output created by this investment. There are three possible "destinations":

1) some proportion of the new output could be **exported**;
2) some proportion of the new output could **replace imports**; or
3) some proportion of the new output could be **absorbed domestically**
   - that is, it could replace existing domestic output or be absorbed by increased demand for the domestically produced output.

For each good type i (defined as being produced by estimation industry i), we have data on

X_i - export volumes;
M_i - import volumes; and
S_i - domestic manufacturers' sales volumes.

The export propensity we redefine as

$$\tilde{e}_i = \frac{X_i}{S_i + M_i}$$

and the import penetration ratio we redefine as

$$\tilde{m}_i = \frac{M_i}{S_i + M_i}$$

The use of this particular denominator is made clearer by defining $D_i = S_i - X_i$ as the domestic absorption of output that is produced domestically. Thus:

$$S_i + M_i = X_i + M_i + D_i$$

which is simply the sum of the volumes of the three possible "destinations" for new output.

The preferred measure of the proportion of total manufacturing investment in total tradeable capacity[18] is

$$T = \frac{\sum (\tilde{e}_i + \tilde{m}_i) \cdot I_i}{\sum I_i} \tag{3}$$

The results for this measure and its two components are given in Table 5 for the years 1984/85 to 1988/89; the results for this preferred measure are reproduced in Graph 6.

Table 5: Tradeable Investment as a Proportion of Total Manufacturing Investment

Year	Proportion of Total Manufacturing Investment in		
	Export Creating Capacity[19]	Import Replacement Capacity	Total Tradeable Capacity
1984/85	16.2	16.8	33.0
1985/86	17.2	17.3	34.5
1986/87	15.2	16.8	32.0
1987/88	16.6	17.6	34.2
1988/89	15.8	21.7	37.5

[18] Note that we distinguish this measure from the previous measure of total manufacturing investment in the *tradeable sector*.

[19] We also calculated the proportion of total manufacturing investment in export creating investment using the Wood et al. definition of the export propensity. The results for each of the years 1984/85 to 1988/89 are: 18.2, 19.5, 17.6, 19.2, and 19.0 per cent.

Our results using the preferred approach show a rise in the share of total manufacturing investment in total tradeable capacity from 33.0 per cent in 1984/85 to 37.5 per cent in 1988/89. Most of this rise can be attributed to a rising proportion of total manufacturing investment in import replacement capacity, with the strongest gain from 1987/88 to 1988/89. The proportion of manufacturing investment in export creating capacity remained fairly constant over the period; as expected this measure was slightly lower than the same calculated using the Wood et al. definition of the export propensity, though both moved together.

An examination of the relative prices of manufactured exports and imports to the GDP deflator[20] (Graph 7) suggests an explanation for the results in Table 5. Relative manufactured export prices remain fairly flat from the beginning of 1981/82 through to the end of 1988/89, while relative manufactured import prices rose significantly from 1984/85 and stayed high until 1986/87. Thus the share of investment in import replacement capacity appears to be reacting to changes in relative prices with a lag of a few years.

Changes in the proportion of manufacturing investment in total tradeable capacity can be broken into two parts - that due to changes in trade ratios for each industry and that due to changes in relative growth rates of investment between traded and non-traded sectors.[21] Our results imply that investment in tradeable capacity rose mainly due to a relatively higher rate of growth of investment in those estimation industries which were relatively tradeable, rather than an increase in the tradeability of industries - and this is true for both import competing and export creating investment.

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[20] Manufactured export and import implicit price deflators are derived from Australian Bureau of Statistics (1990b), Cat. no. 5302.0.

[21] The algebra is similar to Section 5(c). Note that for discrete changes the breakdown will depend on the choice of base years for investment and trade ratios. In this case the general results remain unchanged.

**Graph 7: Trade prices
relative to the GDP deflator**
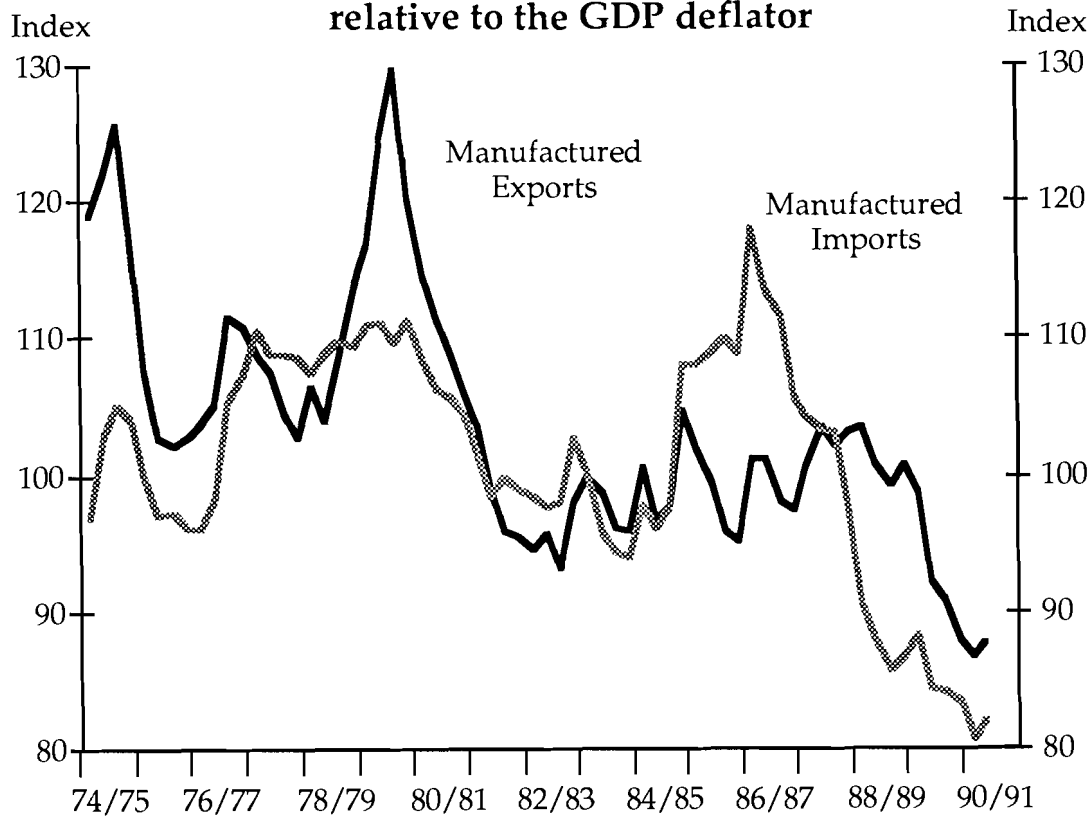
7. CONCLUSION

Drawing on unpublished data at a disaggregated level, we were able to provide a more detailed picture of the direction of investment over the 1985/86 to 1988/89 investment boom. The disaggregated data shows that just over one quarter of the growth in real non-farm capital expenditure was in the real estate and property development industry. We present evidence that the investment undertaken by real estate operators and developers was substituting for building and structures investment formerly undertaken by end users. At the same time however, the composition of building and structures investment had changed. In particular the share of building investment going to offices grew quite strongly from September 1987 to September 1989.

Using the same investment data combined with trade data, we calculated an improved measure of the proportion of total investment directed towards the tradeable sector. We extended the Wood et al. (1990) methodology to investment in import competing industries. Our measure

takes account of the fact that a significant proportion of any industry's output is neither exported nor subject to import competition - even for highly tradeable industries. Measures of the share of investment in the tradeable sector which do not take account of this fact (Treasury (1990) and the BIE (1990)) will overstate the proportion of investment in the tradeable sector.

Our findings suggest that there has been a modest rise in the proportion of manufacturing investment which has gone into tradeable capacity in the later part of the period studied. This has been because of the share of investment going into import replacement capacity. This is consistent with a lagged response of investment to movements in relative prices.

Appendix 1: Estimation Industries Description

This information has been taken from the Australian Standard Classification (1983).

Estimation Industry	DESCRIPTION	Contribution to Growth in Total Investment 1985/86 to 1988/89	Growth of Investment 1985/86 to 1988/89
01	mining metallic minerals	13.5	115.3
02	mining coal, oil and gas, construction materials, other non-metallic minerals, services to mining including mineral exploration	-3.5	-11.2
03	manufacturing food (meat and milk products, flour mill and cereal food products, bread, cakes and biscuits)	0.7	9.3
04	manufacturing fruit and vegetable products	-	-
05	manufacturing other food products	1.9	87.2
06	manufacturing beverages and malt	1.5	61.5
07	manufacturing tobacco products including cigarettes	-	-
08	manufacturing textile fibres, yarns and woven fabrics, household textiles and textile floor covering	1.7	97.4
09	manufacturing clothing and footwear	0.7	54.1
10	manufacturing wood, wood products and furniture	0.7	17.1
11	manufacturing paper and paper products	3.9	84.5
12	printing and publishing includes manufacturing paper stationary and bookbinding	-0.4	-6.7
13	manufacturing basic chemicals	4.7	80.9

14	petroleum refining, petroleum and coal products	1.1	50.2
15	manufacturing non metallic mineral products	3.1	63.3
16	manufacturing basic iron and steel	-3.0	-41.6
17	manufacturing non ferrous metals	0.2	2.9
18	manufacturing fabricated metal products	2.3	63.5
19	manufacturing motor vehicles and parts	1.7	21.7
20	manufacturing other transport parts	1.5	225.3
21	manufacturing photographic, professional and scientific equipment	0.1	5.4
22	manufacturing appliances and electrical equipment	0.7	17.8
23	manufacturing industrial machinery and equipment	2.0	134.8
24	manufacturing miscellaneous items including leather, rubber and plastic products	1.4	36.0
25	electricity and gas	-0.2	-17.7
26	water sewerage and drainage	-1.1	-26.5
32	petroleum product wholesalers	1.9	37.2
33	mineral, metals and chemical wholesalers	1.0	111.8
34	farm properties and produce dealers nec (wool selling brokers, stock and station agents, wool buyers and merchants and cereal grain wholesalers)	0.7	68.7
35	food, drink, tobacco, textile and clothing wholesalers	1.6	71.3
36	general and other specialist wholesalers including photographic equipment, jewellery, toys and sporting goods, books and pharmaceuticals	2.2	83.2

37	remainder of wholesale trade including timber merchants, building hardware dealers, machinery and equipment wholesalers, farm and construction machinery wholesalers, motor vehicle parts wholesalers, electrical and electronic wholesalers	-0.2	-1.8
38	department stores, general, clothing, fabric, shoe and furniture stores	-1.2	-23.3
39	food, milk and bread vendors	4.0	56.7
40	new motor vehicle dealers, boats and caravans dealers	-2.7	-58.4
41	used motor vehicle dealers, motor cycle dealers etc	-0.2	-31.3
42	service stations	0.6	467.0
43	smash repairers	0.7	144.2
44	remainder of retail trade nec including domestic hardware stores, watch-makers and jewellers, music stores, household appliance stores, pharmacies, newsagents and nurseries	0.8	24.5
45	road freight transport including long distance interstate road freight transport and intrastate and short distance road freight	-1.7	-16.2
46	bus and tramway transport including interstate bus transport and short and long distance bus hire and tourist coaches	1.6	86.7
47	road passenger transport and services including taxi and hire cars, car park operations, container terminals and toll road operations	2.0	65.0
48	rail transport	-	-
49	water transport including international sea, coastal and inland transport, stevedoring and water transport terminals	-0.9	-23.7
50	air transport	-	-

51	other transport and storage including road freight forwarding (except road), pipeline operation, shipping agents, travel agents, custom agency services, grain storage, cold storage	-3.2	-59.4
52	communication services including cable services, post offices, radio telephone, satellite, coaxial cable operation, telephone, telex and teleprinter services	-	-
53	finance and investment sector including all bank, non-bank financial institutions, stock exchanges and services to finance and investment	6.1	38.5
54	insurance including life, health and general insurance and superannuation funds	7.2	107.7
55	property and business services nec including plant hire and leasing	5.2	90.1
56	real estate operators and developers	27.5	136.4
57	other business services including data processing services, advertising agencies, market and business consultancy services and pest control	1.8	21.8
58	entertainment, recreational and personal services including motion picture production, motion picture theatres, radio and television stations, creative arts, parks and zoological gardens, lotteries, laundries and dry-cleaners	-	-
59	restaurants, hotels and club	-1.3	-6.9

Estimation industries 27-31 which cover the construction sector are not included in the published CAPEX total.

Appendix 2: Trade Ratios for the Manufacturing Sector

The ABS withheld unpublished manufacturers' sales data at the estimation industry level for four estimation industries on the grounds of confidentiality. In these cases ratios were calculated using data at the next higher level of aggregation.

The Australian Standard Industrial Classification (1983) is comprised of four levels:

- divisions (e.g. Mining (B) and Manufacturing (C));
- subdivisions (e.g. metallic minerals (11) and textiles (23));
- groups (e.g. non-ferrous metal ores (112) and clothing (245)); and
- classes (e.g. bauxite (1121) and men's suits and coats (2452)).

Note that the estimation industry classification scheme that we have from the CAPEX survey (Appendix 1) is a mixture of the ASIC subdivision and group levels.

Note that the proportion of domestic production exported in non-ferrous metals was calculated to be close to one and in some quarters greater than one. The results for this subdivision are very sensitive to measurement errors because exports do account for such a large proportion of sales and imports are negligible.[22] In addition, production in a year could be less than exports in the same period if there was an offsetting stock adjustment.

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[22] BIE encountered the same problem, see BIE (1989) footnote p. 86.

Table 6: Export Propensities for the Manufacturing Sector

Estimation	Industry	1984/85	1985/86	1986/87	1987/88	1988/89
4	fruit & vegetable products	9.9	15.7	17.0	12.6	10.4
6	beverages & malt	5.3	5.0	6.4	7.9	7.4
3, 4, 5 & 7	food & tobacco	21.4	24.2	28.0	28.4	24.7
8	textiles	37.0	51.0	49.6	37.0	27.5
9	clothing & footwear	0.7	0.8	1.2	1.4	1.3
10	wood , wood products & furniture	4.9	4.7	6.3	6.5	7.0
11	paper & paper products	2.0	1.9	2.6	2.5	3.8
12	printing & allied industries	0.2	0.2	0.2	0.3	0.3
13 & 14	chemicals & petroleum	19.5	19.0	21.0	23.7	28.4
15	non-metallic mineral products	1.0	1.0	1.3	1.4	1.6
16	basic iron & steel	8.9	10.5	10.4	8.0	7.0
18	fabricated metal products	1.2	1.2	1.6	2.0	3.2
19	motor vehicles & parts	5.6	5.5	9.2	10.4	6.4
20	other transport equip.	10.0	8.8	10.0	17.9	18.5
21	photographic, professional and scientific equip.	38.7	38.3	36.4	43.1	33.9
22	appliances & electrical equip.	6.2	6.9	8.5	8.1	7.0
23	industrial machinery & equip.	8.2	9.6	10.7	11.4	10.6
24	misc. manuf.	4.1	5.0	6.3	7.7	7.2

Table 7: Import Penetration Ratios for the Manufacturing Sector

Estimation	Industry	1984/85	1985/86	1986/87	1987/88	1988/89
4	fruit & vegetable products	21.1	20.7	14.1	14.2	19.7
6	beverages & malt	5.9	8.1	7.9	8.4	9.6
3, 4, 5 & 7	food & tobacco	7.7	8.1	8.7	8.5	9.0
8	textiles	51.4	57.4	54.5	50.2	49.9
9	clothing & footwear	18.5	16.9	19.0	22.3	22.8
10	wood , wood products & furniture	0.7	0.2	0.1	1.1	2.9
11	paper & paper products	21.8	19.4	21.8	23.9	25.5
12	printing & allied industries	1.8	1.9	1.8	1.5	1.2
13 & 14	chemicals & petroleum	35.5	37.9	41.7	42.1	46.7
15	non-metallic mineral products	10.5	8.2	7.5	7.7	9.0
16	basic iron & steel	11.3	10.0	10.0	10.3	11.8
18	fabricated metal products	5.7	5.5	5.2	8.4	13.2
19	motor vehicles & parts	32.0	33.7	26.6	27.3	33.7
20	other transport equip.	52.8	41.5	47.0	42.3	54.5
21	photographic, professional and scientific equip.	74.2	76.1	71.1	74.5	74.1
22	appliances & electrical equip.	50.1	52.0	46.6	46.5	49.3
23	industrial machinery & equip.	52.4	57.0	50.7	53.8	55.8
24	misc. manuf.	26.5	30.1	28.9	30.3	32.8

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Generally import penetration ratios for manufacturing industries have not exhibited any significant trends over the period 1985/86 to 1988/89. The exceptions are chemicals and petroleum and fabricated metal products for which import penetration ratios have risen substantially over the period. Horton and Wilkinson (1989) report a rising trend in the endogenous import penetration ratio from September 1986. However, our findings are still consistent with those of Horton and Wilkinson. Firstly their definition differs slightly from ours and is an economy wide penetration ratio (they use the ratio of imports to non-farm sales). Secondly when taking annual averages of the data they used, both the endogenous and the total import penetration ratios fall from 1984/85 to 1986/87 then rise strongly to 1988/89 (see Table 8). These results are comparable to those ratios we calculate for some manufacturing industries, in particular motor vehicles and parts and other transport equipment.

Table 8: Import Penetration Ratios for the Non-Rural Economy

	1984/85	1985/86	1986/87	1987/88	1988/89
Endogenous Imports	15.6	15.4	13.9	15.2	19.2
Total Imports	18.2	18.0	16.7	17.7	22.3

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