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CHARACTERISTICS OF AUSTRALIAN COMMERCIAL PROPERTY MARKETS: TOWARDS AN IMPROVED FORECASTING MODEL

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Abstract

The cyclic nature of commercial property models in many parts of the Western world is a well known and much discussed phenomenon. Using this knowledge expeditiously, however, to forecast future office space demand, vacancy levels and rents is still not far advanced despite the obvious benefits in being able to do so.

This paper examines the office markets of Eastern Australia – Sydney, Melbourne, Brisbane and Canberra – and explores the characteristics of these markets, the similarities, differences and interrelationships between them. It finds that these markets do not operate independently and that there are both local and global factors at work in the individual markets. The conclusion from this is that in order to forecast a particular office market, the total market (in this case the Eastern Australian Office market) and most closely related local markets should also be taken into account.

Keywords

Office markets, forecasting, cycles.

Introduction

The cyclic behaviour of office markets is a well known and much discussed phenomenon. Key papers such as those by Wheaton (1987) and Voith and Crone (1988), both of which examine the US national office market, and Barras (1983 and 1994) which examine the London office market have helped to maintain this as a very fertile area of property research for the last two decades. Recent additions such as those by Pyhrr et al (1999), Grisson and DeLisle (1999), McGough and Tsolacos (1999) and Kummerow (1999) in the special edition of the Journal of Real Estate Research (Volume 18 No.1) devoted to property cycles, ensure that this will continue to be an active research topic for some time to come.

Demand for office space comes primarily from economic growth generating office employment. However, underlying economic growth is far from steady and hence, so too, is demand for office space. Since large scale office construction is a very lengthy process with anything up to eight (8) years or more from initial planning to occupation of a new building, anticipation of future demand, so that building completion hopefully coincides with an upturn in employment and demand for office space, is critical. In any location, the entire construction industry seeks to anticipate these favourable demand conditions. This herd mentality among developers and their backers must, almost inevitably, lead to speculation and oversupply of office space and a resultant increase in vacancy rates and downturn in rents and property values. It takes many years for the market to work through these unfavourable conditions until, eventually, the anticipation of future demand sets the whole, unstable process in motion once again. Hence, small changes in anticipated economic conditions are amplified many times over in the long term performance of the office market.

While office development can be a very lucrative activity, poor timing of investment and construction decisions can lead to disaster with owners looking for tenants for new buildings when none are to be had. This situation can be exacerbated when recourse to bankruptcy can allow development companies to largely eliminate the downside risk of their decisions leaving others (banks and private investors) carrying the loss. Forecasting future office space demand is therefore recognised as being critically important but, for a variety of reasons, such forecasting is still very much a ‘black art’. This paper will briefly examine some of the reasons for the failure to develop accurate office space demand forecasting models and suggest some areas of possible future research and attendant data requirements.

It has already been noted that the office market amplifies anticipated movement in economic circumstances. Hence, the impact of economic factors on the office market need to be closely examined. This is no easy matter as we live in very dynamic times when technological changes are having a very profound impact on employment needs in traditional areas of white collar employment while also giving rise to new areas of employment - and new uses of space – whose future demands are extremely difficult to predict.

It is also important to focus on where any market forecast fits into the decision making process. If developers wish to examine the likely success of a particular office development, they need to know something of the future demand for that class of property in the particular location. This traditional thinking has led to ideas of

market segmentation (and data collection) into various quality grades at distinct (capital city) locations. The question which naturally arises from this is whether a particular location – such as the Sydney CBD – with its various classes of office space, constitutes a single market or whether, in fact, it is a component part of a larger market. Dividing office markets into quality grades (and rental bands) recognises the differing needs of various space users and their sensitivity to changes in rent. It allows for the examination of the movement of office users from one grade to another.

The rise of suburban office markets over the last 20 or more years, with their different rental structures has created a greater range of options for users of office space (both tenants and owner occupiers). Further, the national and global considerations of large office space users, with possibly substantial inducements being offered to companies to locate in one region rather than another, needs to be considered. From a forecasting viewpoint, a model which considers the competition and interaction between markets (or sub-markets) may be worthwhile pursuing. It may also help to overcome some of the data problems of the scarcity and/or lack of historical data at some locations.

This paper goes a small way towards examining these factors and particularly the interactions between individual property markets.

Data

Analyses in this paper are based on time-series data from 1970 to 1998 provided by BIS Shrapnel. It includes relevant office market characteristics (available and occupied space, completions, net occupancy growth and vacancy rates) for CBD and suburban office markets in Sydney, Melbourne, Brisbane and Canberra (the data on occupied space in Brisbane is not available for the early 70s while the data for Canberra does not commence until 1980). All the data consists of annual values being end of June for Melbourne, Brisbane and Canberra but end of December for Sydney. To allow for direct comparison and summation of the data, the Sydney data was "adjusted" to end of June values. This involved taking moving averages or moving geometric means as appropriate but does, unfortunately, have the attendant problem of smoothing the data to some extent.

For the purposes of this paper, Sydney CBD and non-CBD, Melbourne CBD and non-CBD, Brisbane CBD and non-CBD and Canberra are examined as sub-markets of the Eastern Australian property market. A data set comprising all these locations (with the exception of Canberra as data was only available for Canberra from 1980) is referred to in this paper as the Eastern Australian property market or 'total' property market.

Results

Exhibits 1 to 4 compare graphically the available supply of space in these separate office markets. In exhibits 1 and 3, the size of the combined office markets can be considered while exhibits 2 and 4 show the changing proportions of each constituent property market over time. Similarly, exhibits 5 to 8 compare net new office supply

(completions), exhibits 9 to 12 compare occupied space and exhibits 13 to 16 compare growth in occupied space.

It should be noted that while the individual markets show some similar trends, there are also some notable differences between them and the 'total' Eastern Australian office market (represented by the full bar in the odd numbered exhibits) is much smoother (and hence more easily forecast) than any of the individual markets.

Exhibits 17 and 18 compare the vacancy rates for the separate markets and include the 'total' market in bold.

In progressing towards the forecasting of future demand and construction in individual markets, a model is fitted to the 'total' market. The model used is that introduced previously by the authors, MacFarlane (1999) and MacFarlane and Moon (1999).

A(t)	=	OS(t) - OS(t-1)	(1)	Demand
OS(t)	=	S(t) * (1 - V(t))	(2)	Vacancy
S(t)	=	(1 - a3) * S(t-1) + CM(t)	(3)	Supply
A(t)	=	OS(t-1) * [a4 + a5 * ((E(t)/E(t-1))-1)]	(4)	Absorption
CM(t+a1)	=	[a6 + a7 * (V* - V(t))] * S(t)	(5)	Construction

where

S(t)	stock of space at time t
E(t)	office employment in period t
OS(t)	occupied space at time t
A(t)	net absorption of space during period t
V(t)	vacancy rate at time t
V*	structural (or equilibrium) vacancy rate
CM(t)	construction completed during period t
a1	is the lag between favourable market conditions and new space appearing on the market
a3, a4 and a5	are parameters to be estimated (see MacFarlane, 1999 for commentary on the model and interpretation of the coefficients).

While not wishing to elaborate on the model fitting in this paper, it is noted that the model fits the 'total' market considerably better than the fits to individual markets. This is, perhaps, not surprising as it was noted earlier that the 'total' market is smoother, and hence more predictable, than the individual component markets.

The dynamic components of the above model are equations (4) and (5) which give rise to the net absorption and completions respectively and these are the characteristics of the data which will be focused upon in the balance of the paper.

Exhibit 19 gives the matrix of correlations between the various markets for annual completions (new supply). Not surprisingly, the correlations tend to be large and positive reflecting the similar spurts and lulls in each market over time (see also exhibits 5 and 7). To remove this effect, the completions in each market are regressed against the 'total' completions across all markets (the Eastern Australian property market) so that the residuals, which should reflect local market considerations, can be examined. This is similar to the way in which REIT returns are regressed against stock returns to give residuals which should more closely resemble pure property performance (Gilberto, 1990). The relevant equation here is:

$$CM_{i,j} = a + b * t_j + e_{i,j}$$

where $CM_{i,j}$ = completions for market i in period j
t_j = 'total' completions in period j
$e_{i,j}$ = residual for market i in period j

The residuals are graphed in exhibit 20 while the matrix of correlations between the various markets for the completion residuals is given as exhibit 21.

Are the sizes of these correlations surprising? On balance, we think they are. They indicate:

- over the 25 year period, growth in non-CBD areas has tended to be higher than the general trend, while that in CBD areas tends to have been lower (see the column of correlations headed 'Year')
- in Sydney and Melbourne, the negative correlations between CBD and non-CBD locations (-.40 and -.59 respectively) indicate some movement in development between CBD and non-CBD areas but this appears not to be the case in Brisbane ($r = +0.38$).
- the positive correlation between Sydney and Melbourne CBD locations indicates a possible positive linkage between Australia's two premier office locations beyond the overall market trend ($r=+0.32$).

This analysis was repeated for net absorption of office space. The correlation matrix of the raw data, the graph of the residuals and the correlation matrix of the residuals are given as exhibits 22, 23 and 24 respectively.

The results are once again very interesting and are very similar to those for completions. It should be noted that going pair-wise through the two residual correlation matrices (for completions and net absorption), while the correlations for net absorption are generally smaller, only 3 of the correlations differ in sign. Two of these relate to the Canberra market which is somewhat different in behaviour from the other markets (see exhibit 18) due to the impact of Federal Government downsizing on a relatively small office market. Canberra aside, the similarity in the two residual correlation matrices indicates fairly strong similarity between completions and net absorption in each constituent market after adjusting for the general trend. As a result, the dot points given under completions also apply to net absorption although the interpretation of the negative correlations between CBD and non-CBD locations for Sydney and Melbourne would be different, here possibly indicating the effect of

some office space users moving between CBD and non-CBD locations within the one geographic area.

Conclusions

While the analysis given here represent work in progress and has not yet reached a definitive position, it would appear that there are inter-relationships between the various office markets in Eastern Australia, over and above the general trend of the market as a whole.

How best to use these relationships from a forecasting viewpoint, is still an open question. Lack of sufficient data across all markets makes methods such as Vector Auto-Regression (VAR) difficult to apply. None the less, the approach of analysing the market as a whole (in this case the Eastern Australia office market) and coupling this with individual sub-market considerations rather than analysing each market as a stand-alone entity would seem to be worthwhile pursuing.

In terms of data requirements, the lack of quality historical data is not easy to overcome. It has been suggested that half-yearly data rather than annual data would improve matters. It is questionable whether this would really provide additional useful information (certainly to justify the additional costs of collection) as the length of the cycle (around 17 or 18 years) is really the limiting factor. Data across a minimum of two and preferably three or more cycles is necessary to be able to forecast with much certainty and this is not addressed by more frequent data collection. Also, in terms of the possible decisions with regard to individual developments, it is difficult from the outset of the construction process to say with any degree of confidence in which half year they are likely to be completed. They would be likely to compete with development coming on stream more than 6 months before or after, rendering half-yearly forecasts of limited additional value.

More useful may be data on the movement of office space users between sub-markets (eg CBD to non-CBD and vice versa) or of large (possibly multinational) companies setting up their headquarters and/or operations in one location rather than another. Ways to incorporate different forms of data – and even qualitative information – into office space demand forecasts may be required if accurate forecasts are to be achieved.

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Exhibit 1: Office Stock ('000 m2)
Selected Office Markets
1971 - 1998

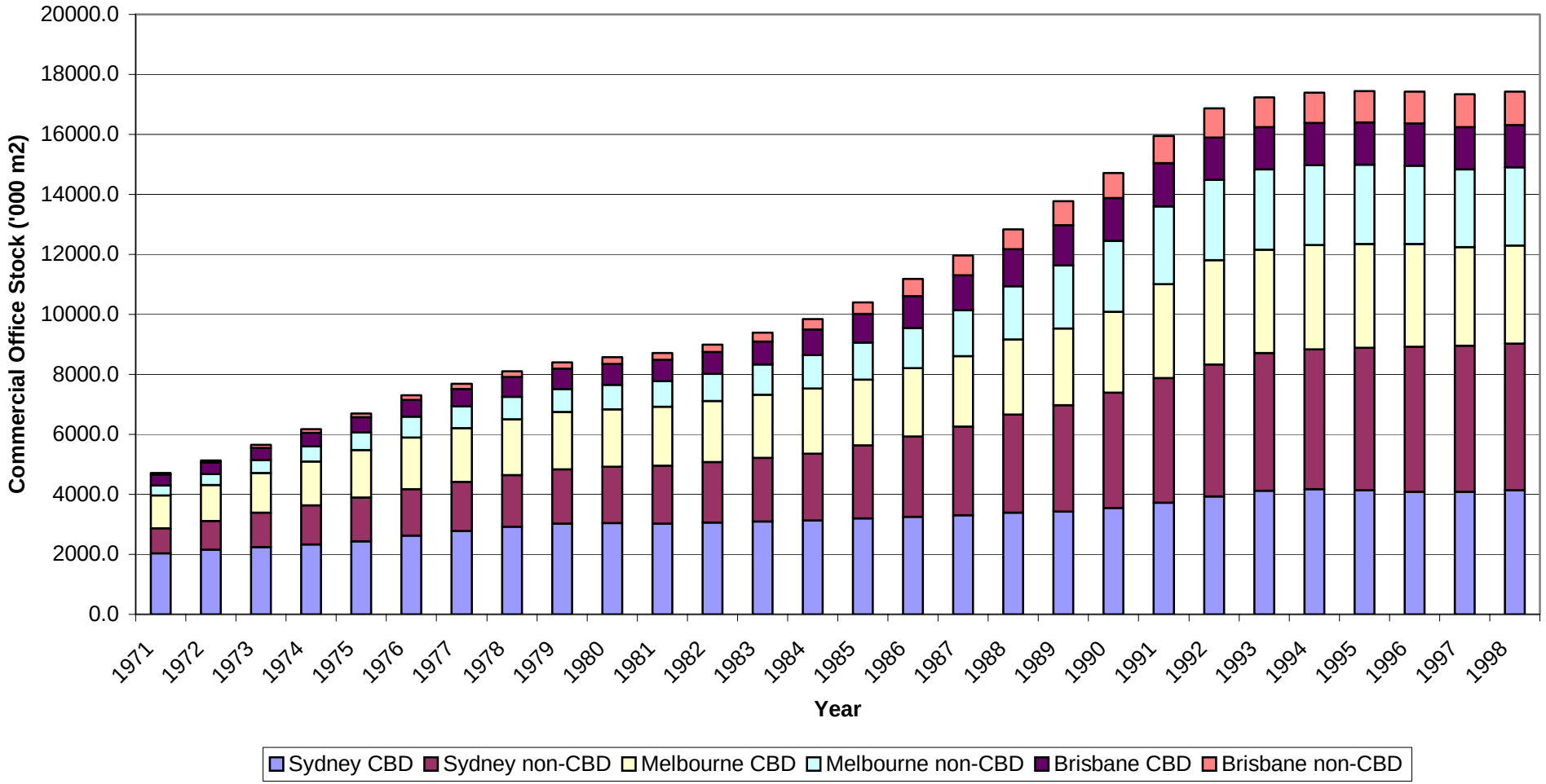

Exhibit 2: Office Stock (% of Total)
Selected Office Markets
1971 - 1998

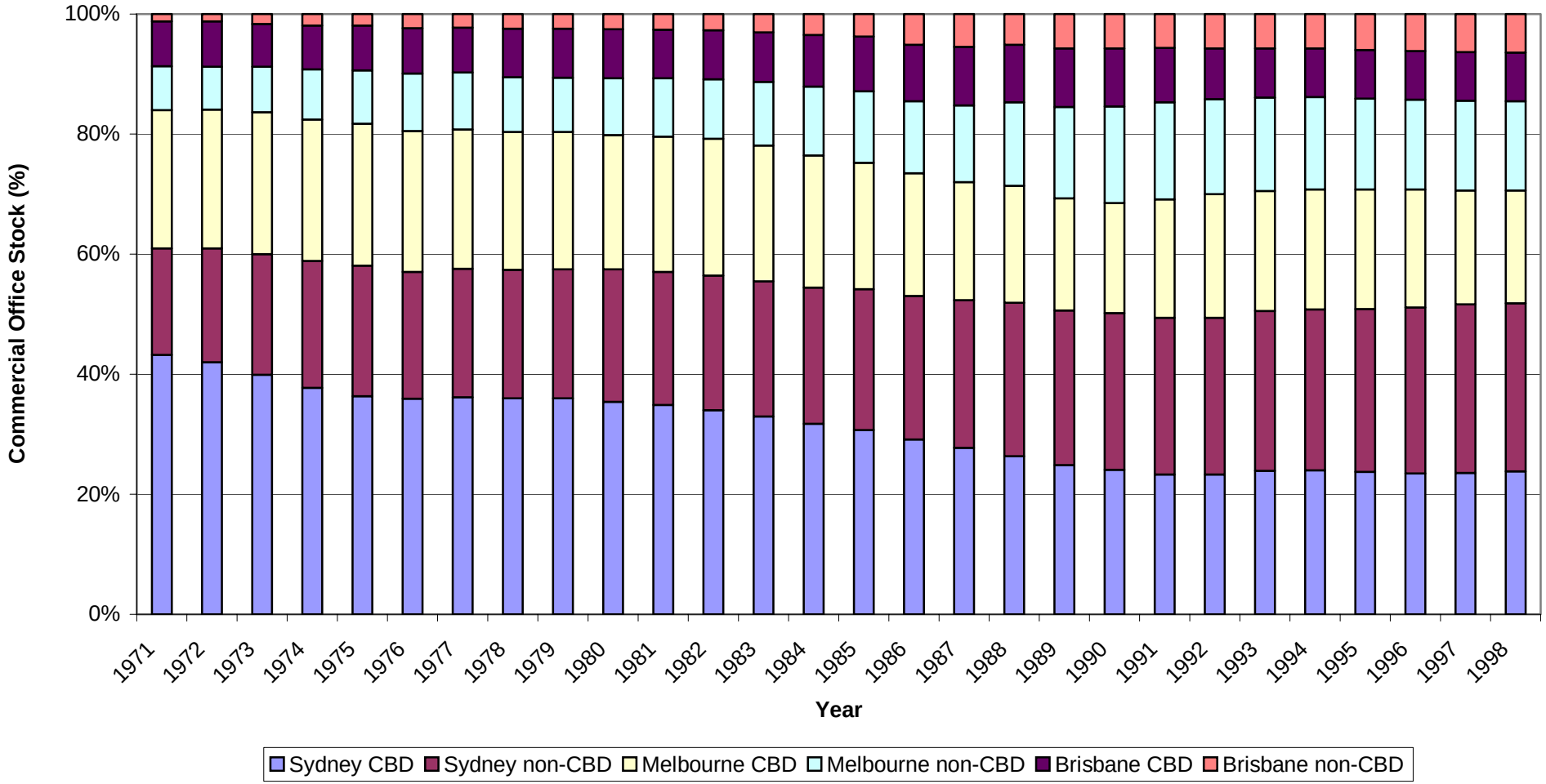

Exhibit 3: Office Stock ('000m2)
Selected Office Markets
1980-1998

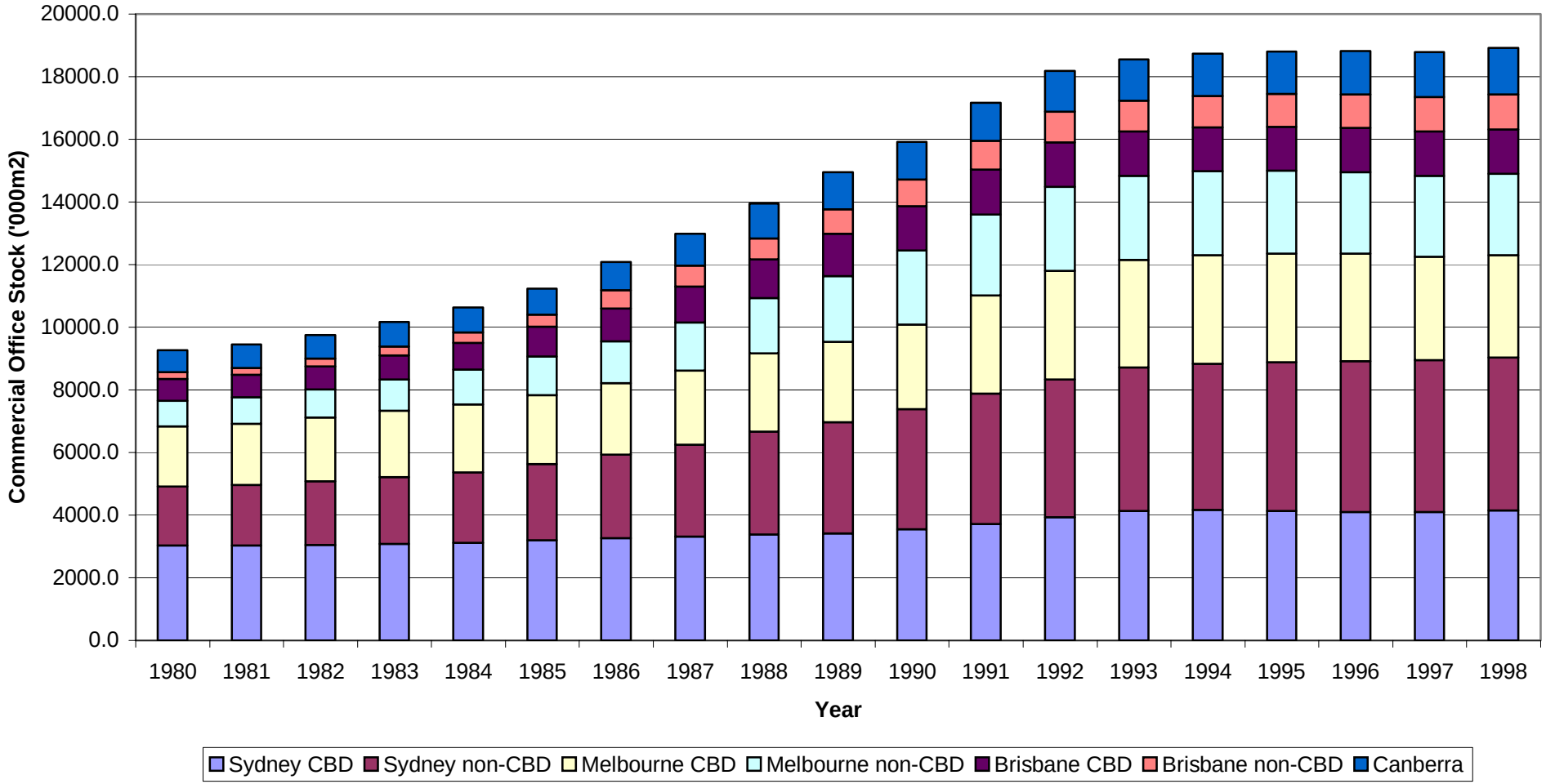

Exhibit 4: Office Stock (% of Total)
Selected Office Markets
1980-1998

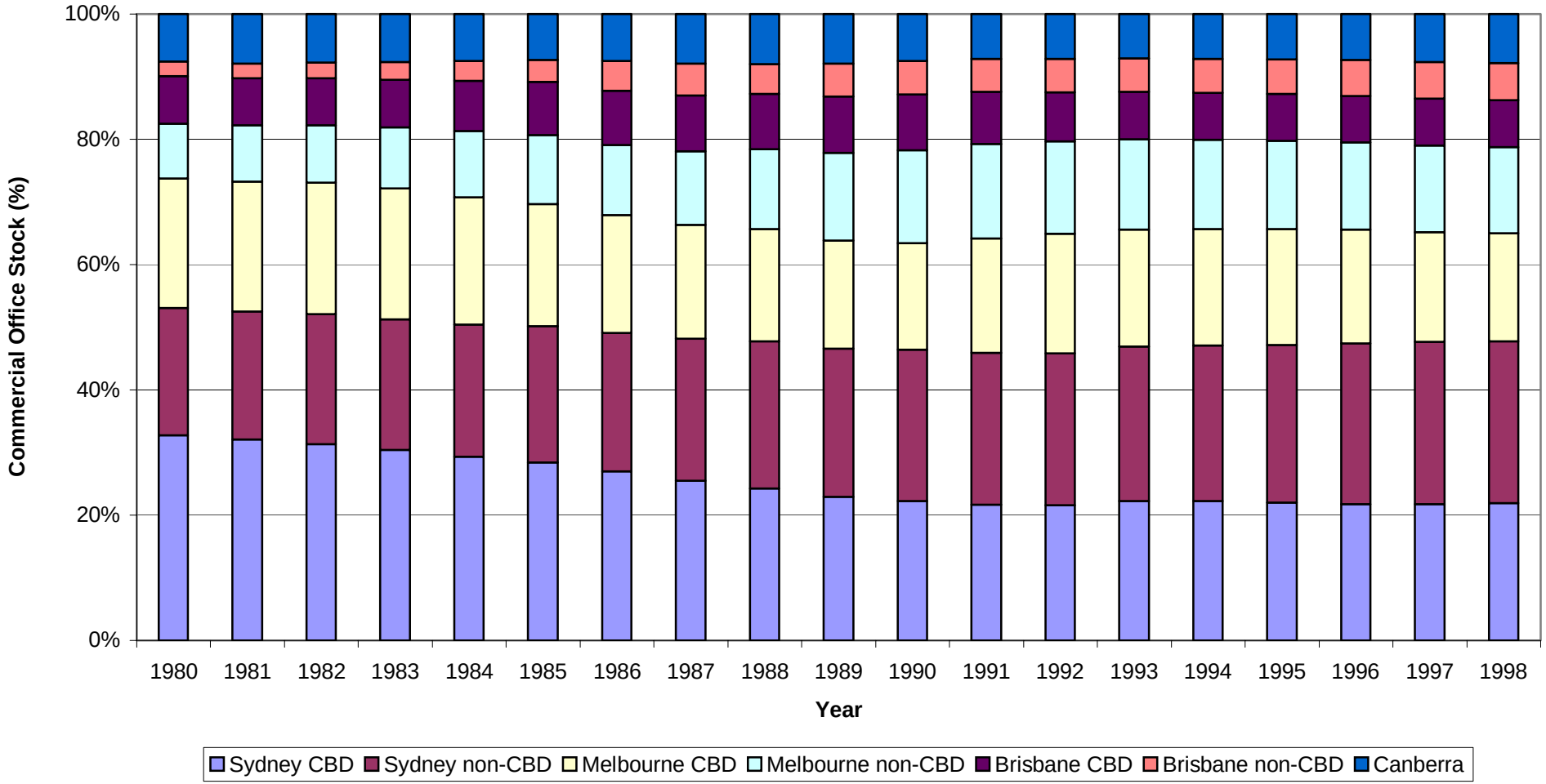

Exhibit 5: Office Stock Additions ('000 m2)
Selected Office Markets
1972 - 1998

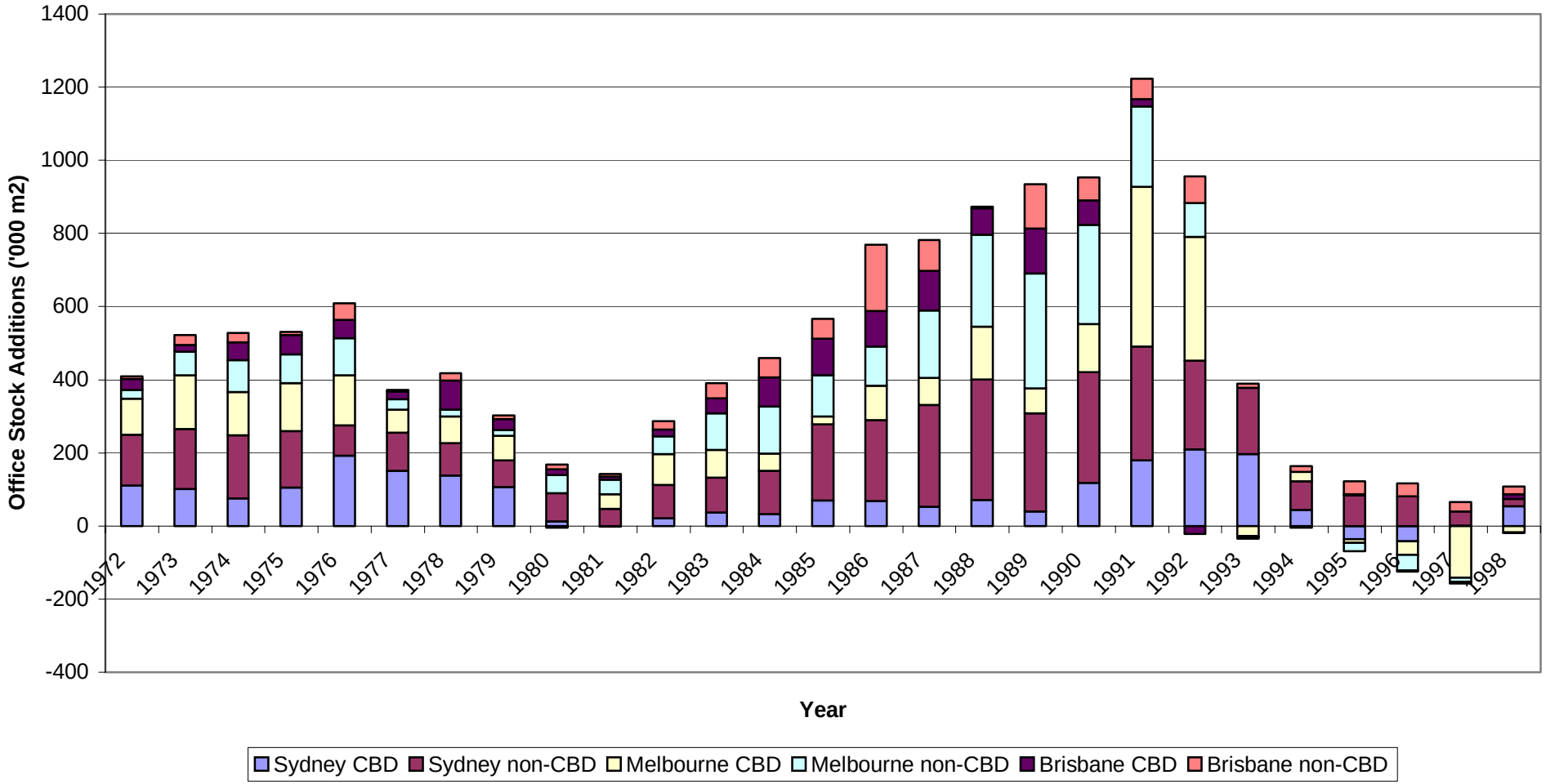

Exhibit 6: Office Stock Additions (% of Total)
Selected Office Markets
1972 - 1998

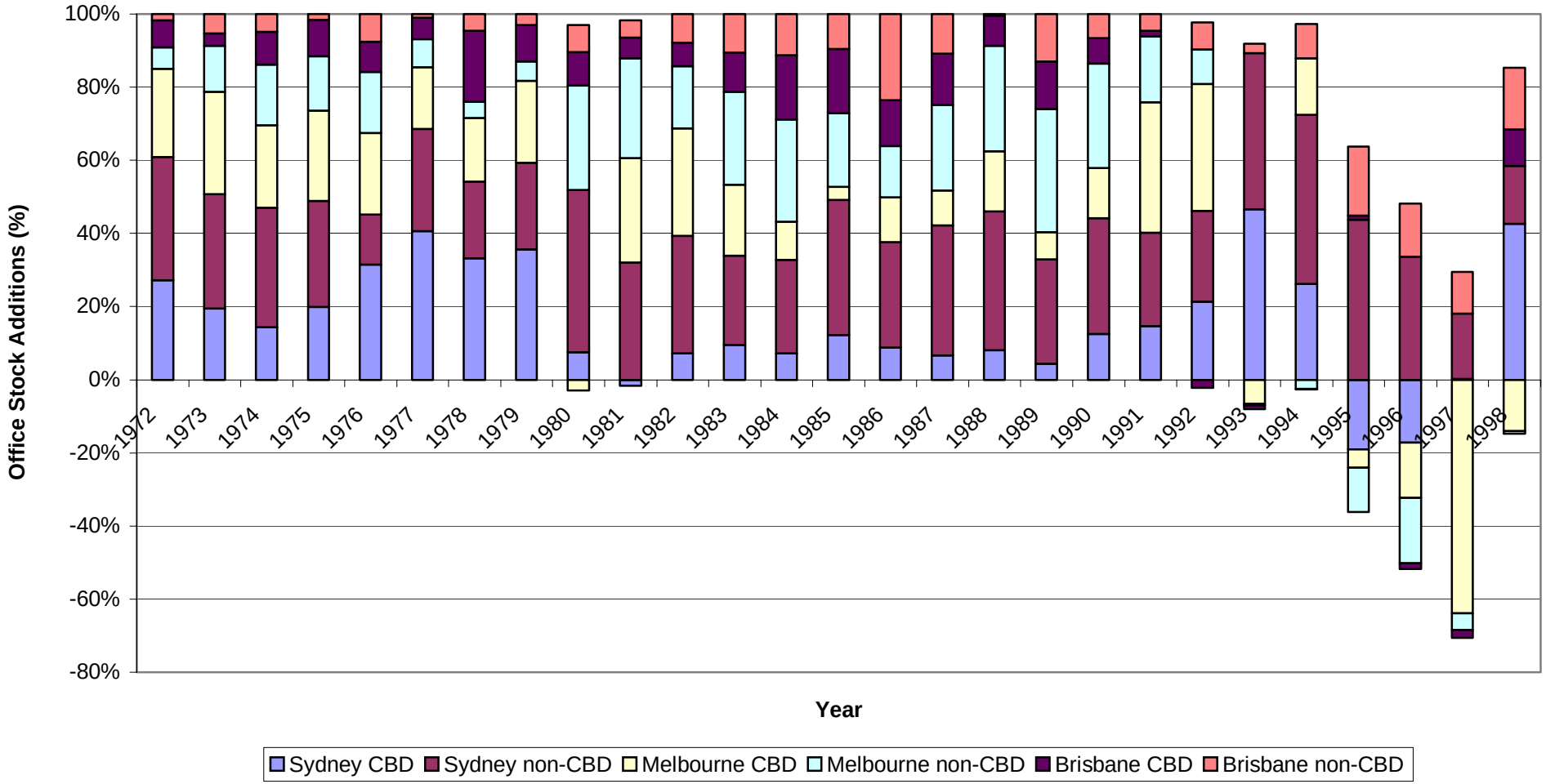

Exhibit 7: Office Stock Additions ('000m2)
Selected Office Markets
1981-1998

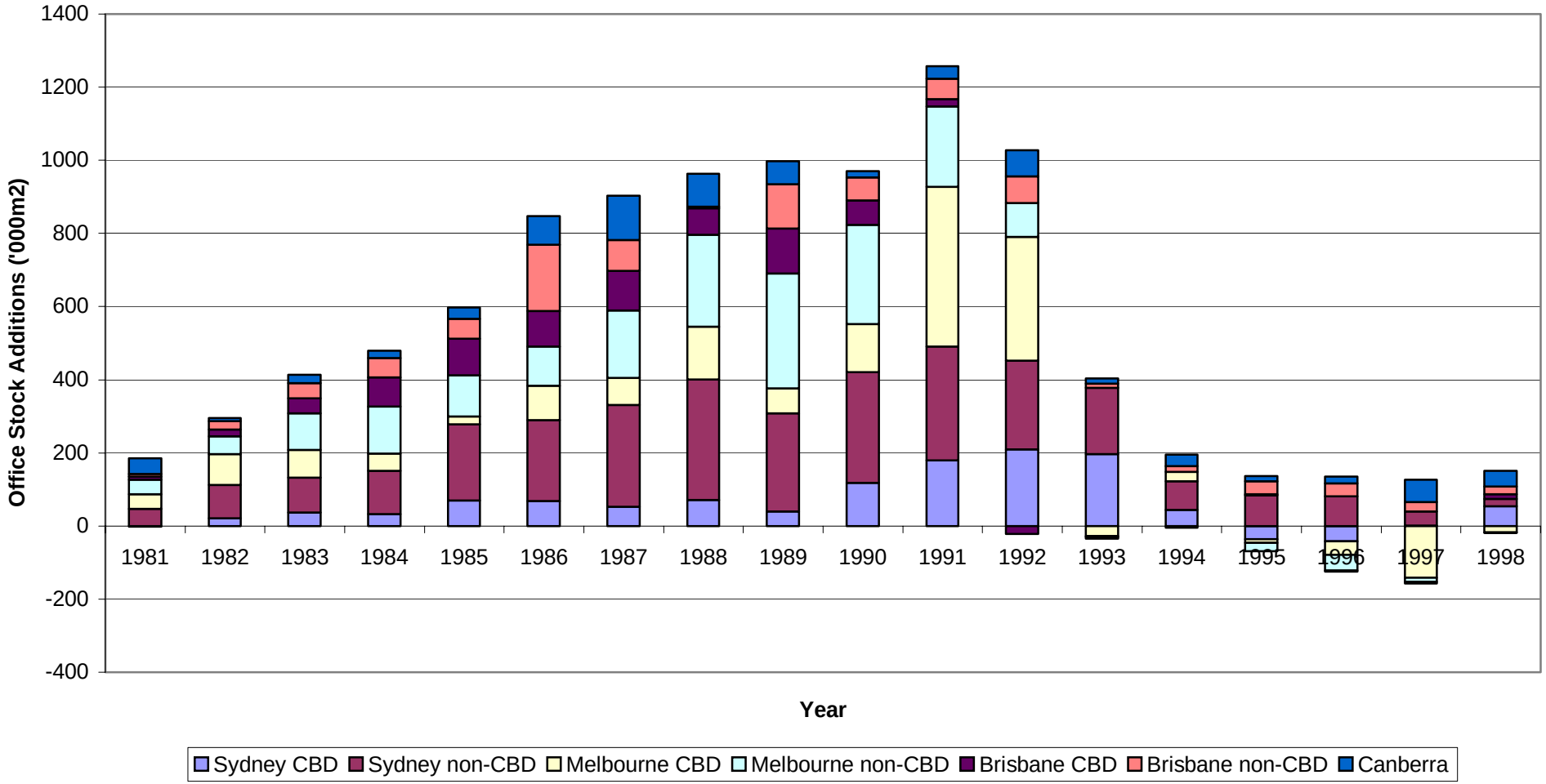

Exhibit 8: Office Stock Additions (% of Total)
Selected Office Markets
1981-1998

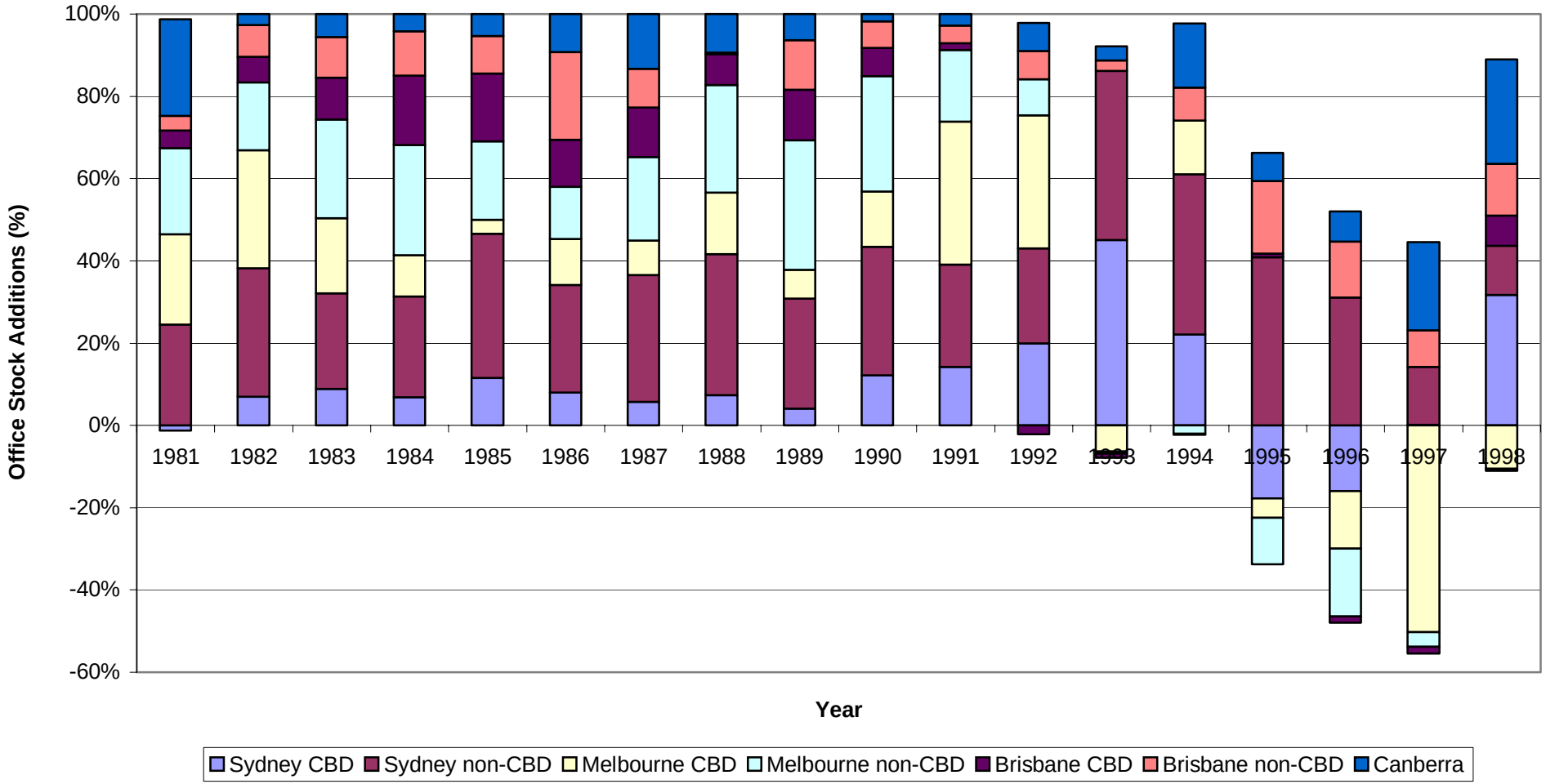

Exhibit 9: Occupied Space ('000 m2)
Selected Office Markets
1972 - 1998

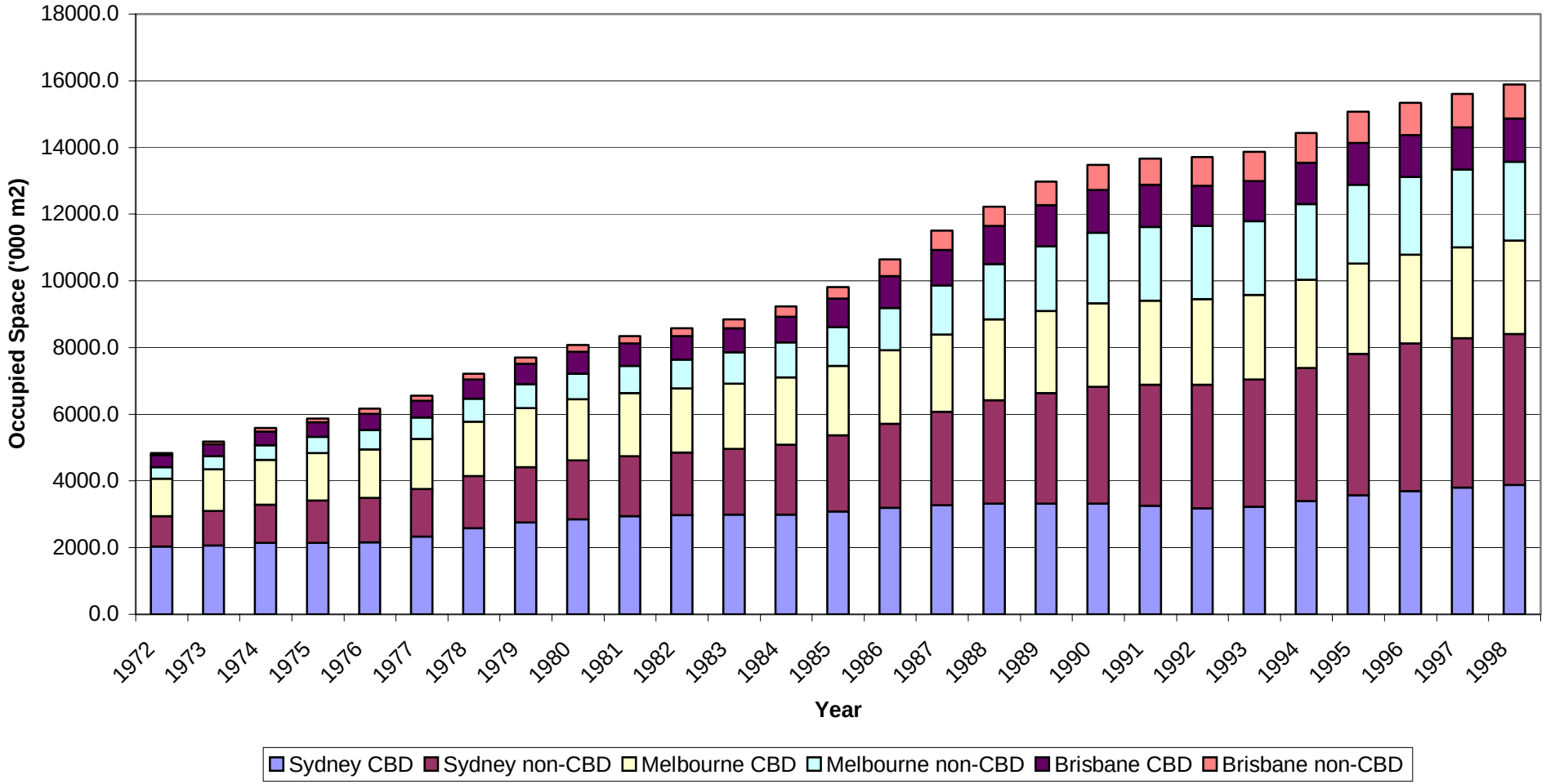

Exhibit 10: Occupied Space (% of Total)
Selected Office Markets
1972 - 1998

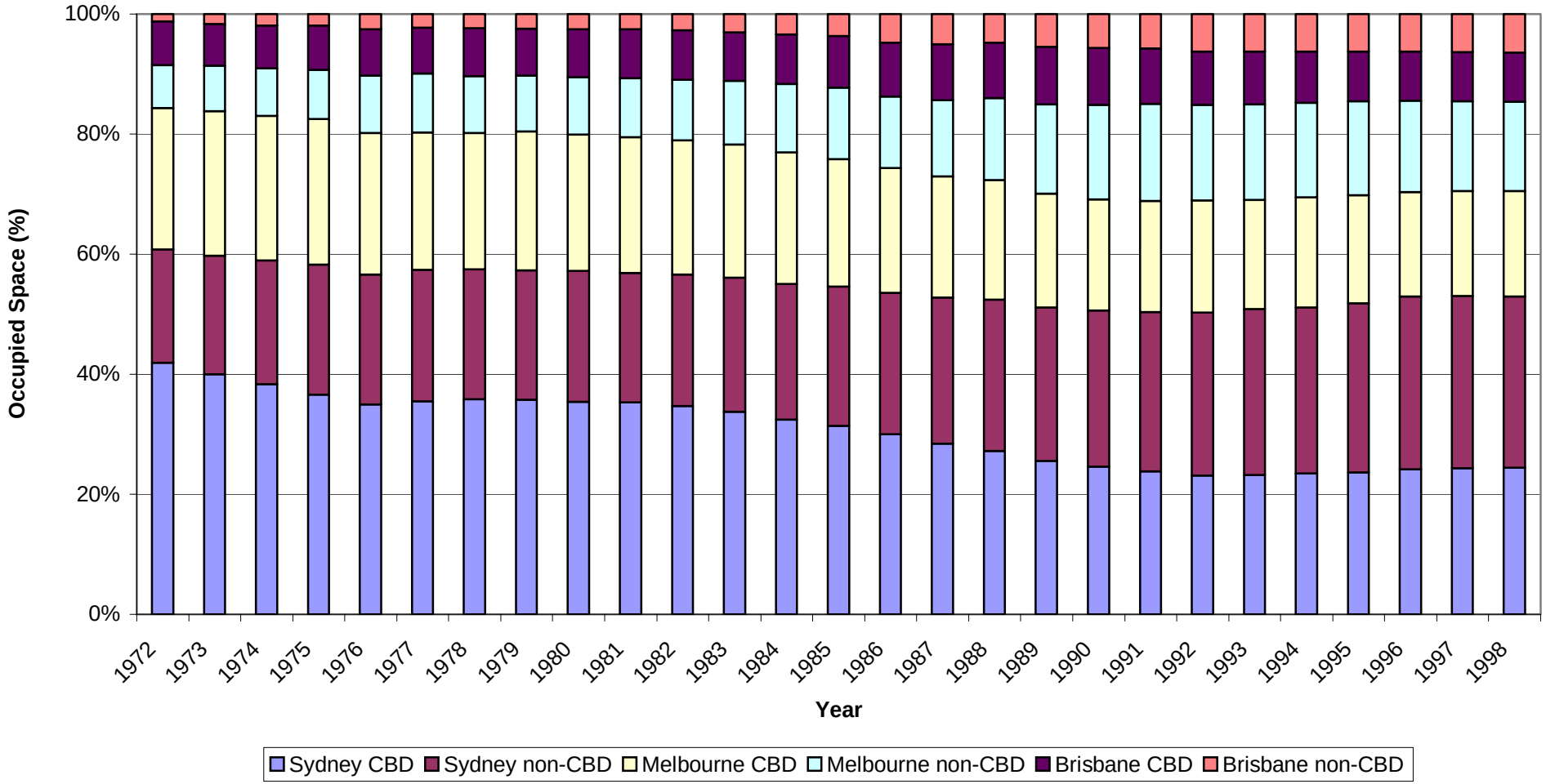

Exhibit 11: Occupied Space ('000m2)
Selected Office Markets
1980-1998

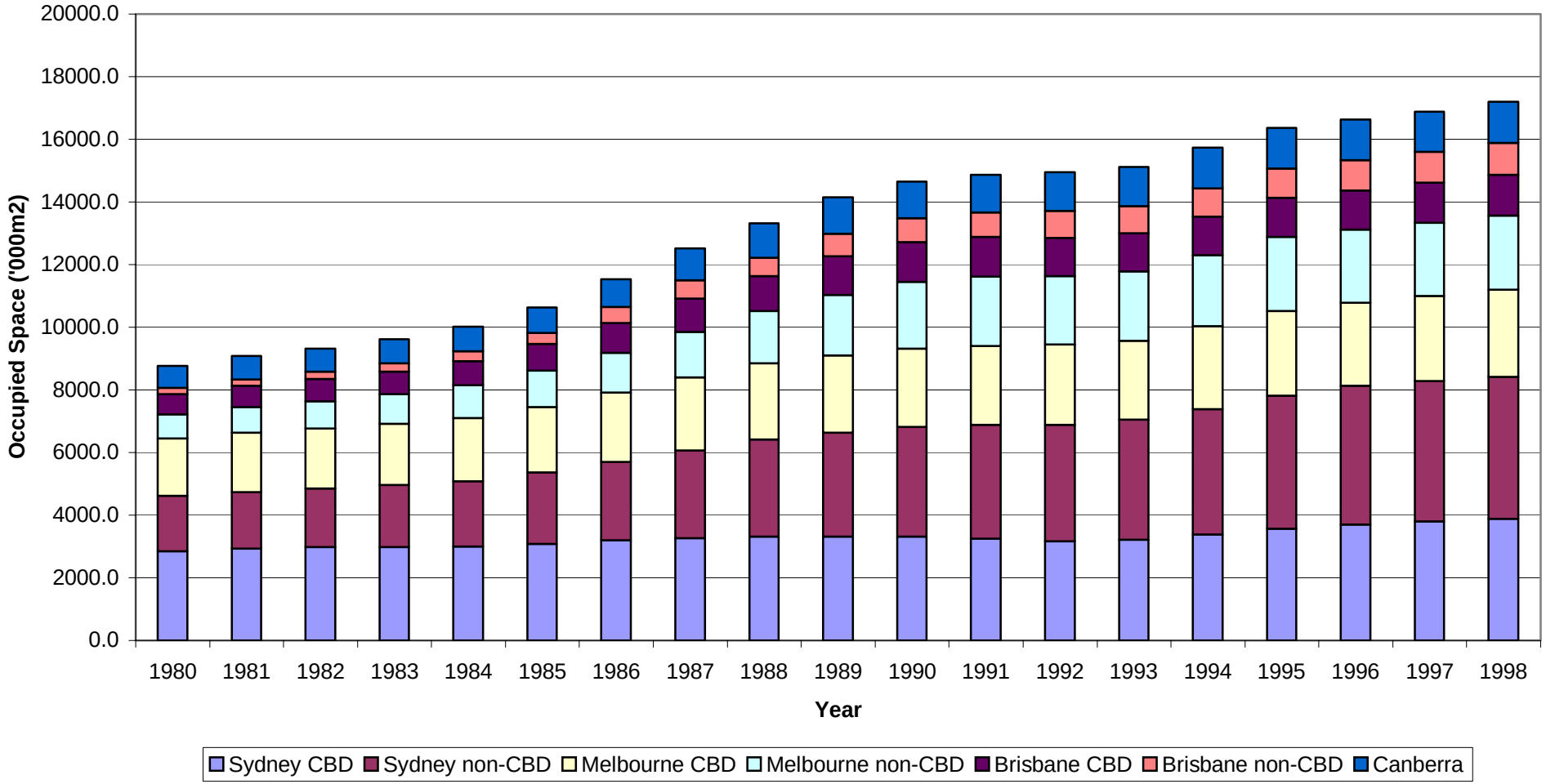

Exhibit 12: Occupied Space (% of Total)
Selected Office Markets
1980-1998

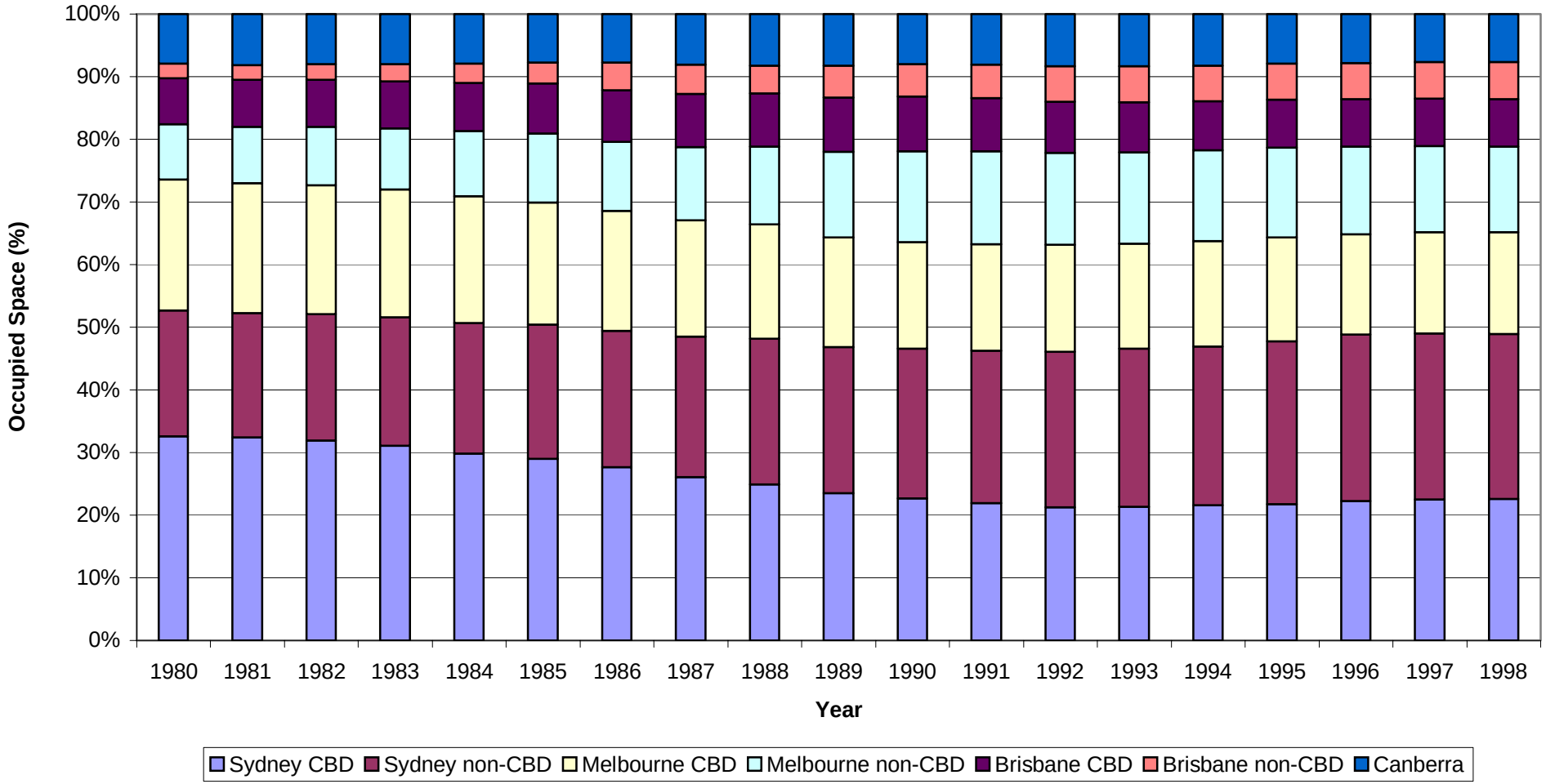

Exhibit 13: Growth in Occupied Space ('000 m2)
Selected Office Markets
1973 - 1998

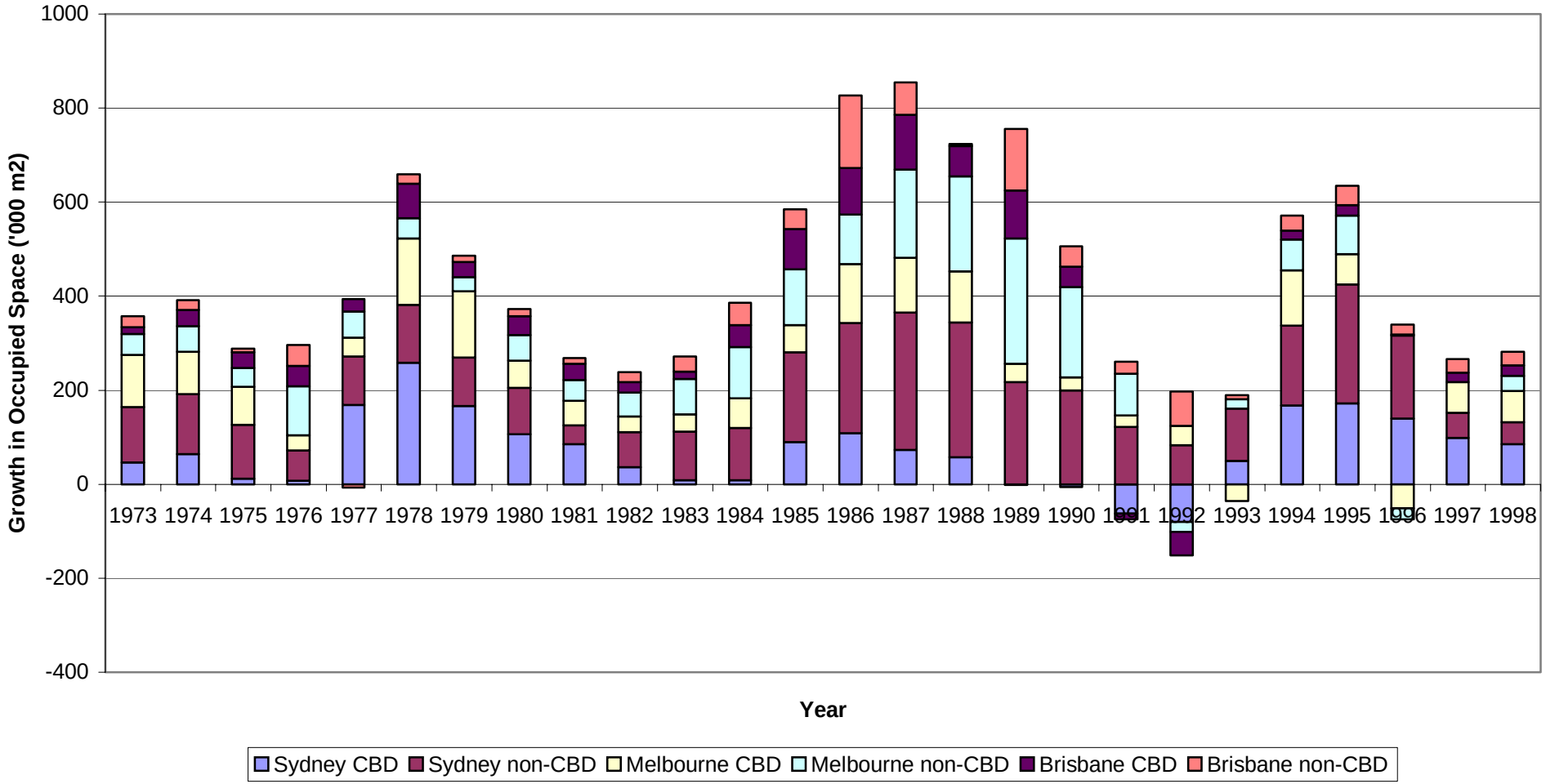

Exhibit 14: Growth in Occupied Space (% of Total)
Selected Office Markets
1973 - 1998

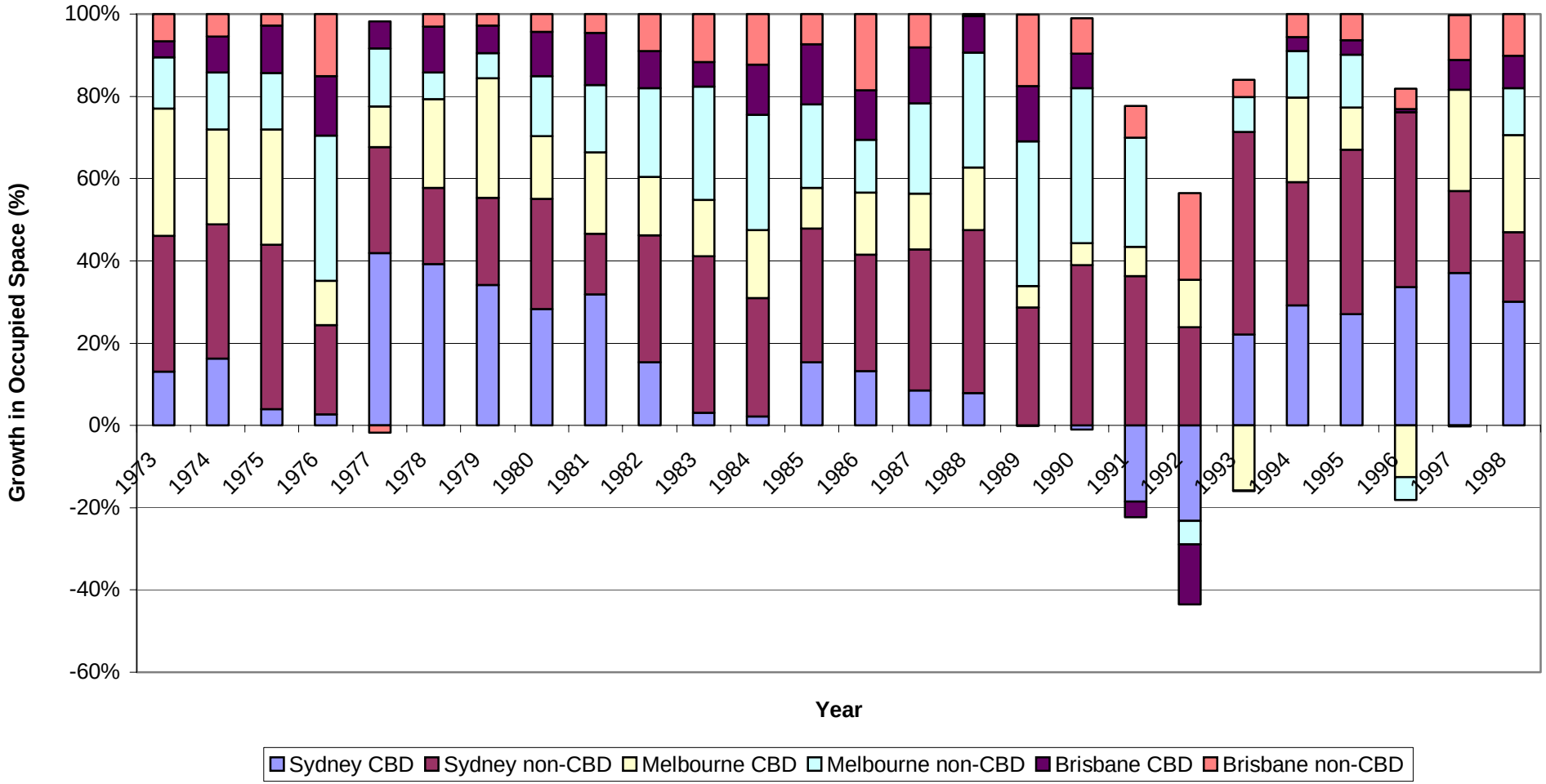

Exhibit 15: Growth in Occupied Space ('000 m2)
Selected Office Markets
1981 - 1998

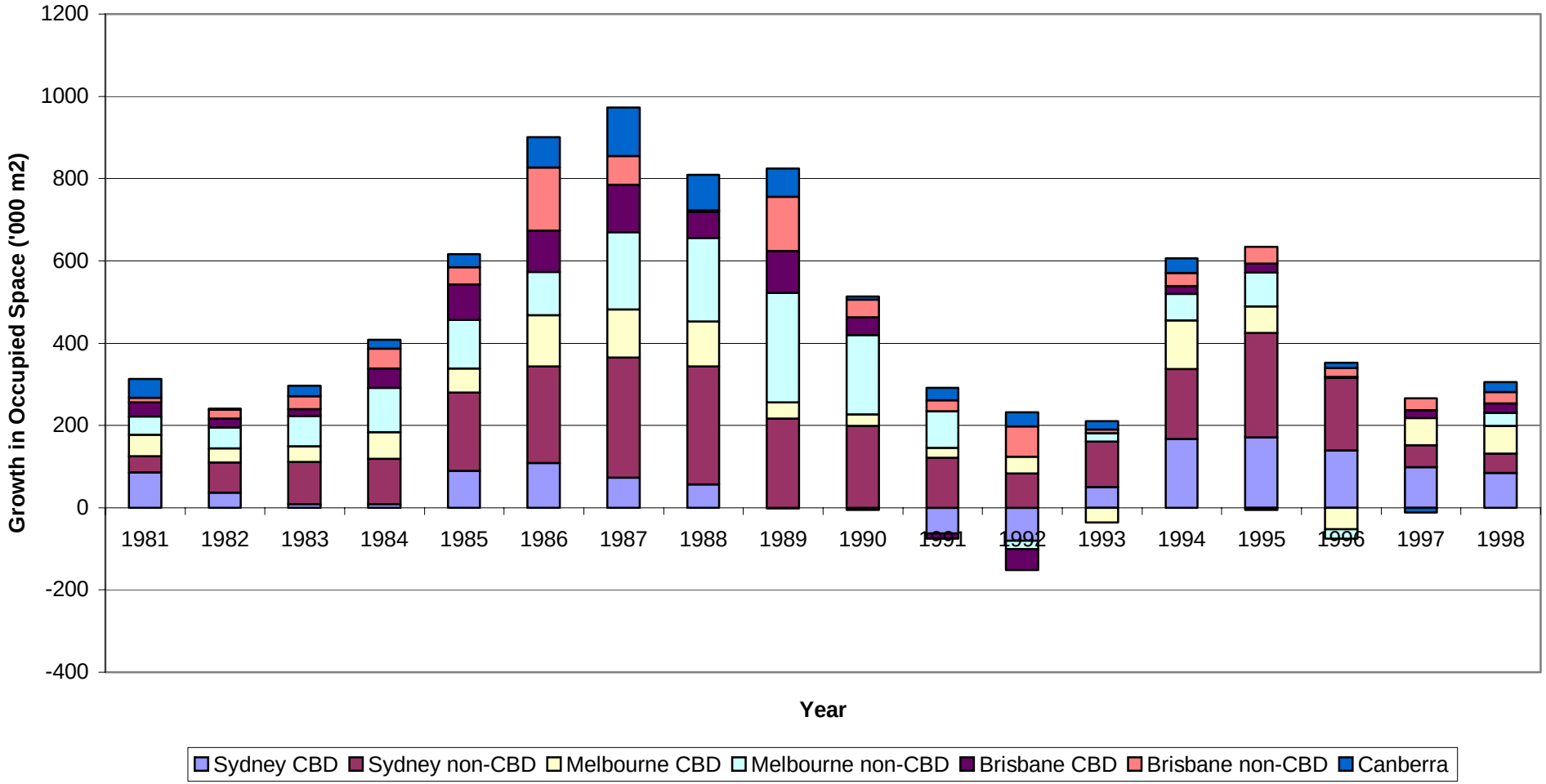

Exhibit 16: Growth in Occupied Space (% of Total)
Selected Office Markets
1981 - 1998

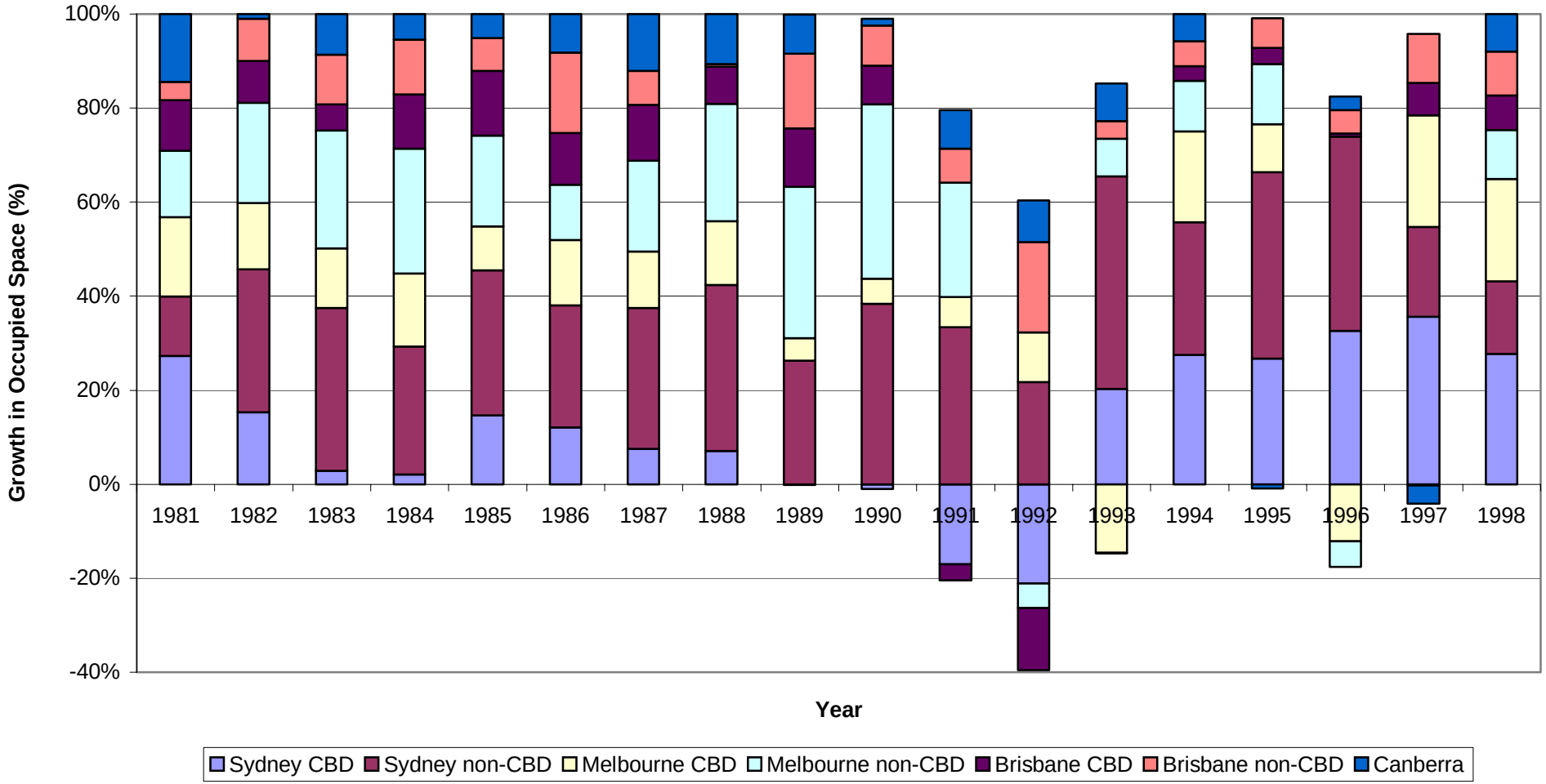

Exhibit 17: Vacancy Rate (%)
Selected Office Markets
1972 - 1998

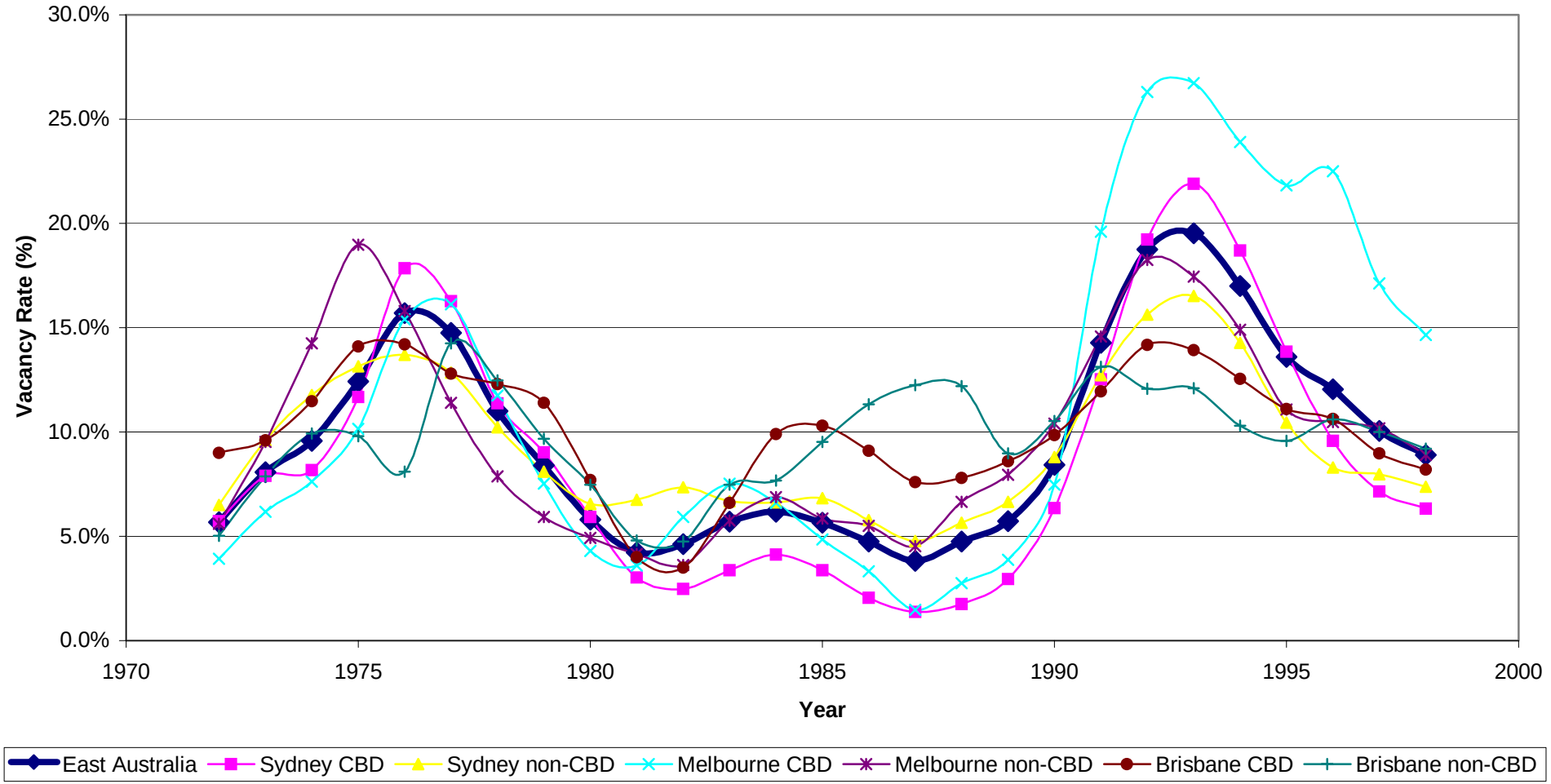

Exhibit 18: Vacancy Rate (%)
Selected Office Markets
1980-1998

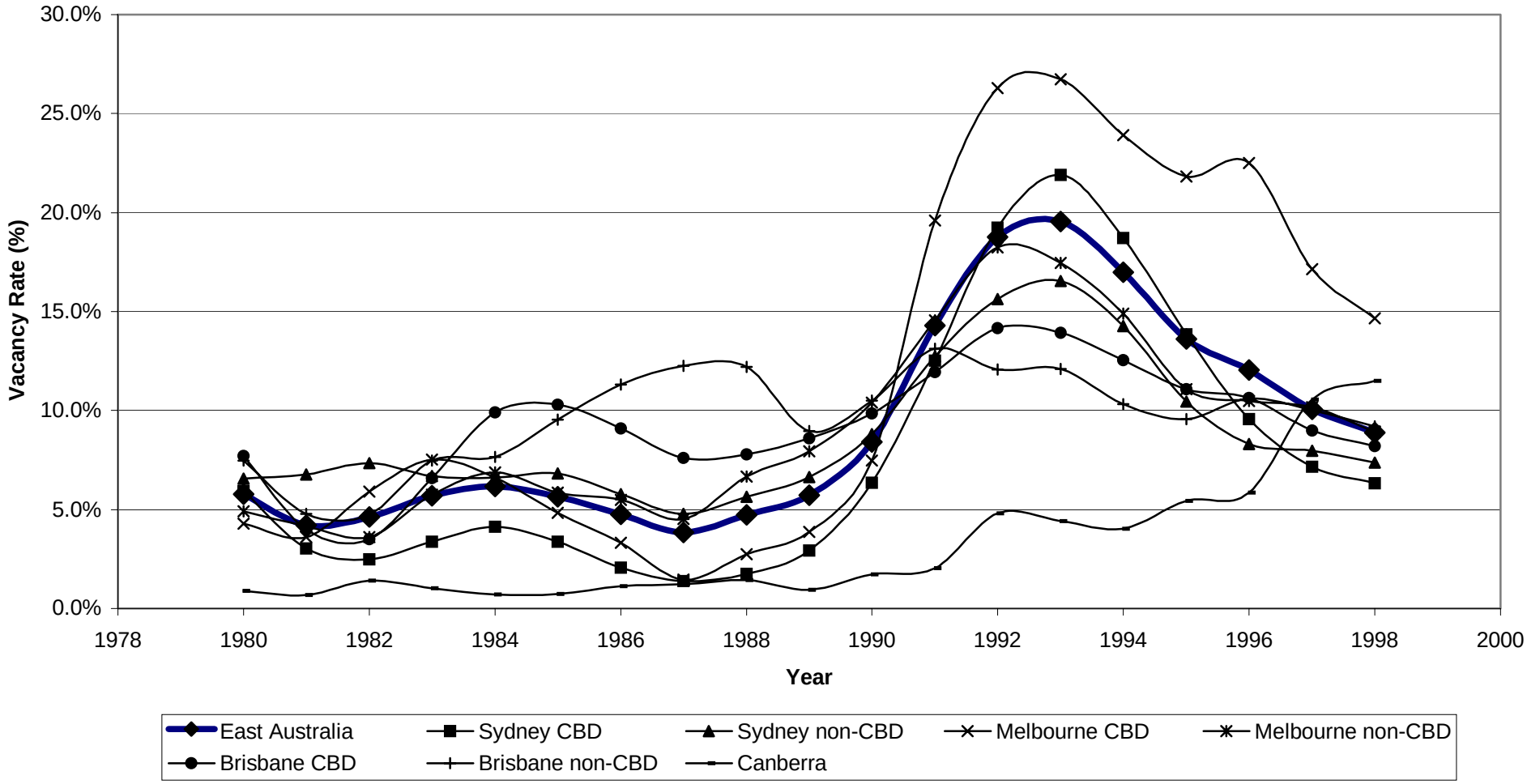

Exhibit 19: Correlation matrix, Net Additions

	Year	*East Aust*	*Sydney CBD*	*Sydney non-CBD*	*Melbourne CBD*	*Melbourne non-CBD*	*Brisbane CBD*	*Brisbane non-CBD*	*Canberra*
Year	1								
East Australia	-0.11	1							
Sydney CBD	-0.27	0.57	1						
Sydney non-CBD	0.08	0.90	0.37	1					
Melbourne CBD	-0.16	0.80	0.62	0.61	1				
Melbourne non-CBD	0.04	0.86	0.20	0.83	0.51	1			
Brisbane CBD	-0.26	0.52	-0.01	0.49	0.05	0.65	1		
Brisbane non-CBD	0.25	0.52	0.00	0.48	0.22	0.50	0.53	1	
Canberra	-0.04	0.40	0.11	0.46	0.18	0.39	0.42	0.41	1

Exhibit 20: Net Additions Residuals ('000 m2)
Selected Office Markets
1971 - 1998

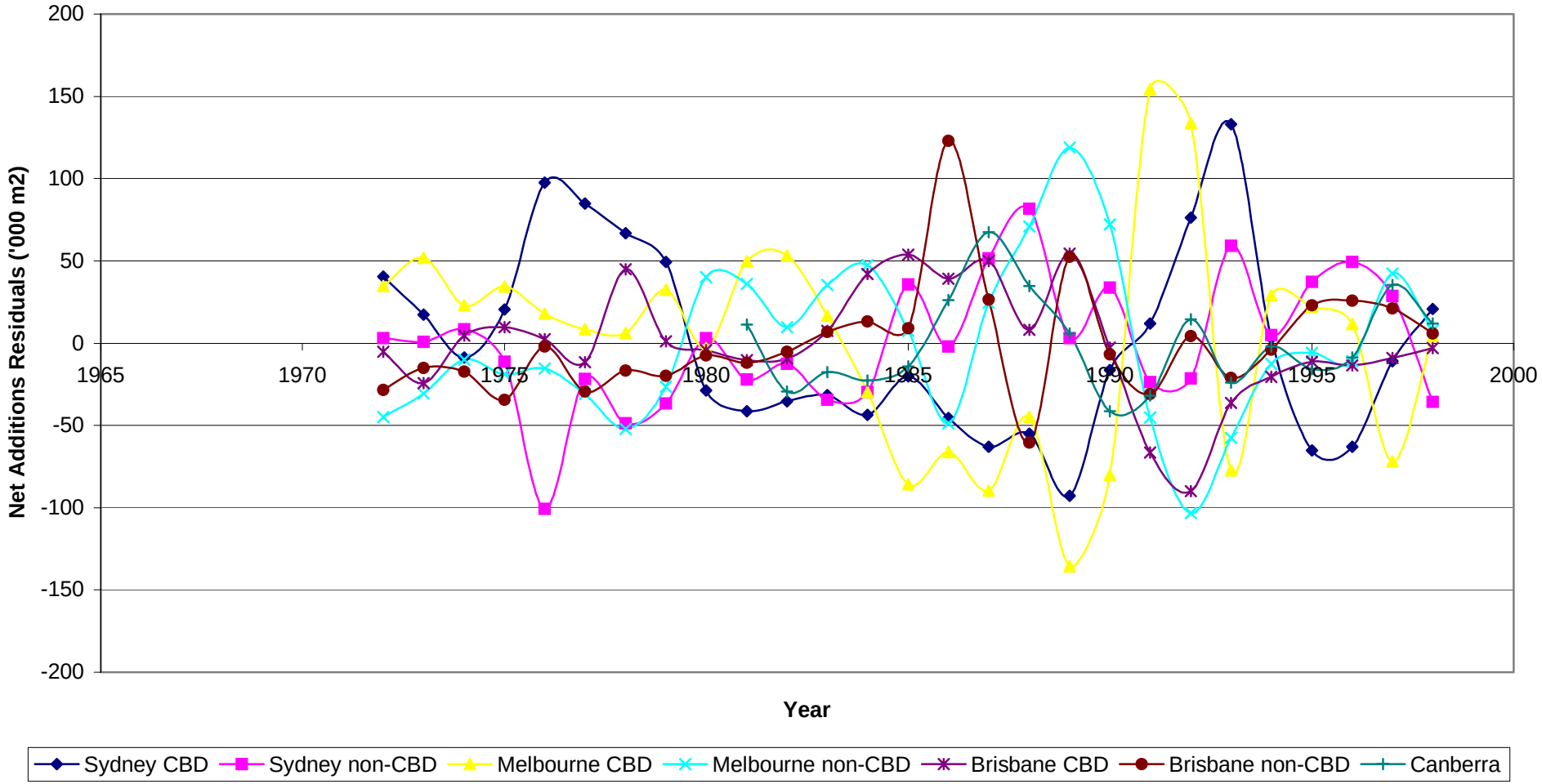

Exhibit 21: Correlation matrix, Net Addition Residuals

	Year	*Sydney CBD*	*Sydney non-CBD*	*Melbourne CBD*	*Melbourne non-CBD*	*Brisbane CBD*	*Brisbane non-CBD*	*Canberra*
Year	1							
Sydney CBD	-0.25	1						
Sydney non-CBD	0.42	-0.40	1					
Melbourne CBD	-0.20	0.32	-0.46	1				
Melbourne non-CBD	0.16	-0.69	0.26	-0.59	1			
Brisbane CBD	-0.22	-0.44	0.05	-0.72	0.51	1		
Brisbane non-CBD	0.33	-0.43	0.02	-0.41	0.09	0.38	1	
Canberra	0.08	-0.22	0.25	-0.27	0.08	0.27	0.26	1

Exhibit 22: Correlation matrix, Net Absorption

	Year	*EA*	*Sydney CBD*	*Sydney non-CBD*	*Melbourne CBD*	*Melbourne non-CBD*	*Brisbane CBD*	*Brisbane non-CBD*	*Canberra*
Year	1								
EA	-0.02	1							
Sydney CBD	-0.03	0.42	1						
Sydney non-CBD	0.25	0.81	0.13	1					
Melbourne CBD	-0.27	0.59	0.39	0.22	1				
Melbourne non-CBD	0.10	0.70	-0.23	0.67	0.18	1			
Brisbane CBD	-0.21	0.86	0.27	0.57	0.45	0.71	1		
Brisbane non-CBD	0.22	0.48	-0.23	0.41	0.13	0.46	0.46	1	
Canberra	-0.33	0.64	-0.07	0.57	0.54	0.59	0.65	0.43	1

Exhibit 23: Net Absorption Residuals ('000 m2)
Selected Office Markets
1973 - 1998

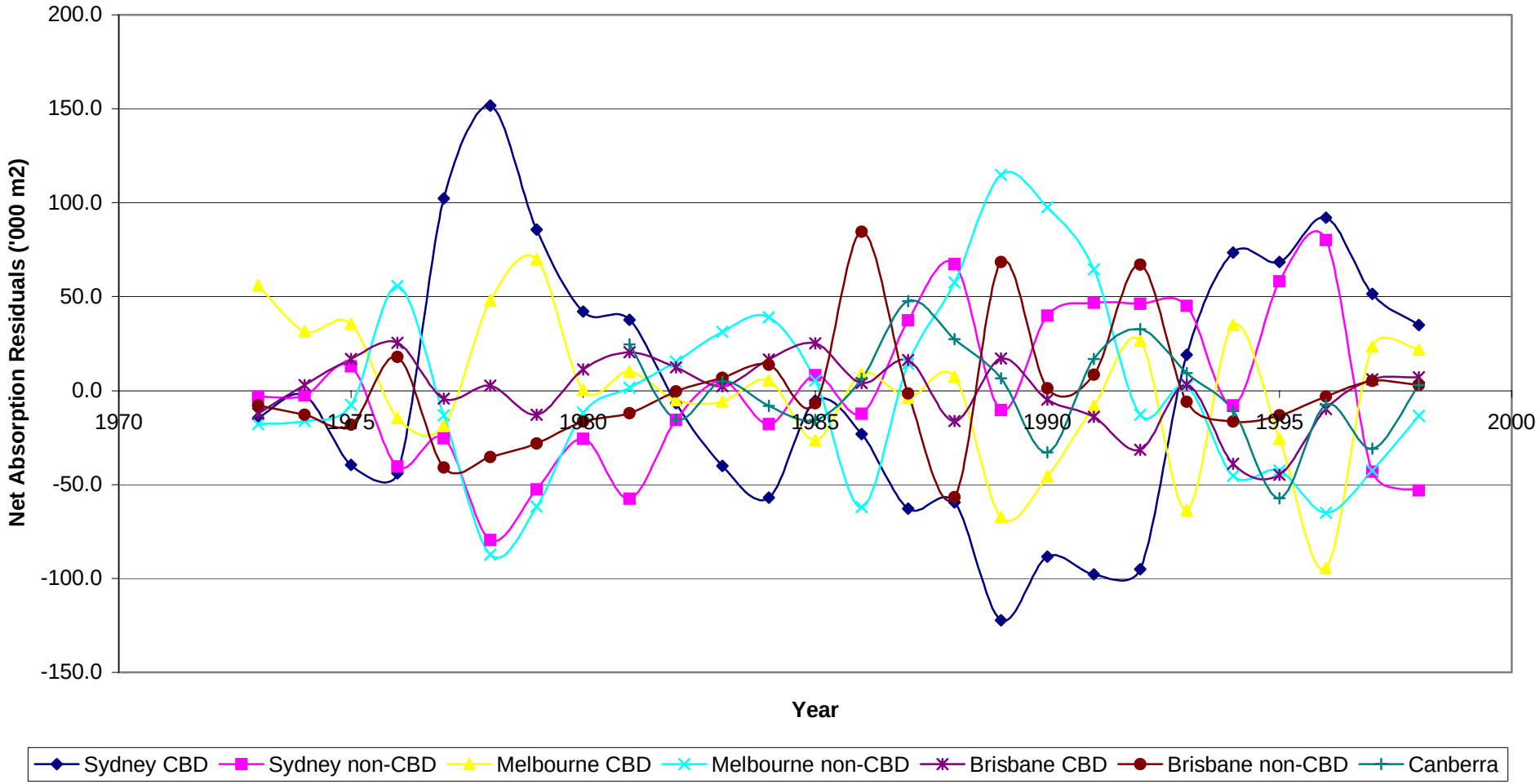

Exhibit 24: Correlation matrix, Net Absorption Residuals

	Year	*Sydney CBD*	*Sydney non-CBD*	*Melbourne CBD*	*Melbourne non-CBD*	*Brisbane CBD*	*Brisbane non-CBD*	*Canberra*
Year	1							
Sydney CBD	-0.04	1						
Sydney non-CBD	0.41	-0.40	1					
Melbourne CBD	-0.42	0.19	-0.52	1				
Melbourne non-CBD	0.01	-0.80	0.25	-0.41	1			
Brisbane CBD	-0.39	-0.20	-0.43	-0.14	0.30	1		
Brisbane non-CBD	0.25	-0.54	0.05	-0.21	0.20	0.12	1	
Canberra	-0.30	-0.44	0.06	0.20	0.19	0.23	0.14	1