

THE SIGNIFICANCE AND PERFORMANCE OF INDUSTRIAL INVESTMENT PROPERTY IN AUSTRALIA

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ABSTRACT

Industrial property is an important property investment sector and contains both direct industrial property and industrial LPTs. The purpose of this paper is to assess the significance of industrial property, the importance and performance of industrial property type, size, value and geographic region in Australian industrial property and the strategic role of direct industrial property and industrial LPTs in a mixed-asset portfolio over Q3:1995-Q2:2006. Risk-adjusted performance analysis is used to assess the added-value of industrial property in a portfolio, with the portfolio diversification benefits of industrial property also assessed. Industrial property and industrial LPTs are shown to provide consistent and well-performed risk-adjusted returns, although both industrial property and industrial LPTs has seen some loss of property portfolio and mixed-asset portfolio diversification benefits in more recent years.

Keywords: Industrial property, industrial LPTs, industrial property type, performance analysis, portfolio diversification.

INTRODUCTION

Industrial property is an important property sector in Australia, with core industrial property estimated to account for \$39 billion (23%) of Australia's core property assets of \$170 billion (Higgins, 2005, 2006). The industrial sector¹ also makes an important contribution to the Australian economy, being the largest employment sector in NSW (22% contribution) and the largest contributor to GDP in NSW (22% contribution) (Ernst & Young, 2003). With industrial property performance closely linked to economic performance, the strong GDP growth in Australia in recent years has seen enhanced stature and performance by industrial property. In particular, average real GDP growth in Australia was 3.3% p.a. over 1996-2006, with GDP growth of 3.2% projected for 2007 (JLL, 2006a). This has seen industrial values in Sydney increase by 10%-15% p.a. over the last ten years (JLL, 2005).

¹ Includes contributions by manufacturing, transport and storage, and wholesale trade sectors

Importantly, in the last ten years, there has been a fundamental structural change in Australian industrial property. This shift has seen a movement away from the manufacturing industries and a focus on transport/storage/logistics and distribution-based industries (CBRE, 2006; JLL, 2005); further assisted by the recent significant infrastructure developments seen in the major capital cities in Australia (JLL, 2005; Nevill, 2006a), as well as increased interest by institutional investors in industrial property (CBRE, 2006; JLL, 2005). This structural change has resulted in changing characteristics and demand for industrial property (eg: high-tech, distribution, warehousing) and the emergence of new industrial areas/growth corridors close to improved infrastructure support.

Given the stature and changing nature of industrial property in Australia, it is important to assess the significance and performance of industrial property. While research on industrial property is not as extensive as the office and retail property sectors, it has largely concentrated on the determinants of US and UK industrial property performance (eg: Ambrose, 1990; Atteberry and Rutherford, 1993; Buttimer et al, 1997; Fehribach et al, 1993; Jackson, 2002; Lockwood and Rutherford, 1996; Thompson and Tsolacos, 2001) and modelling/forecasting industrial property performance (eg: Thompson and Tsolacos, 1999, 2000; Tsolacos et al, 2005). In an Australian context, previous research has largely concentrated on the performance characteristics of industrial property in Australia (eg: JLL, 1993; Kim, 1998, 2003; Newell, 1996, 2005; Newell and MacFarlane, 1996, 1998); this previous research having been at the overall “Australian” industrial property level.

With the increased importance and changing structural characteristics of industrial property in Australia, it is important to critically assess the performance of industrial property at an industrial property sub-sector level to enable more informed and practical investment decision-making regarding the role of industrial property in portfolios. The purpose of this paper is to assess the stature and performance of different industrial property types, sizes, values and geographic regions in Australia over Q3:1995-Q2:2006; particularly highlighting the risk-adjusted performance and portfolio diversification benefits provided by these various industrial property sub-sectors in a mixed-asset portfolio. The significance of industrial property in institutional portfolios and the diversity of industrial property investment vehicles in Australia will also be highlighted.

SIGNIFICANCE OF INDUSTRIAL PROPERTY IN AUSTRALIA

Significance of industrial property

Industrial property was undergone significant structural change over the last ten years, moving away from a manufacturing base to a transport/storage/logistics/distribution focus (CBRE, 2006; JLL, 2005). This shift has seen the traditional industrial areas with a lack of new zoned industrial land, small lot sizes, increasing rents and outgoings, and close to city areas losing momentum to the newer industrial growth corridors/areas with available

serviced industrial land, larger facilities, lower costs, growing population base and located near significantly improved transportation infrastructure (JLL, 2005).

Other specific changes regarding industrial property have been:

- need for larger industrial properties via consolidation of existing distribution operations (Colliers International, 2006; JLL, 2005)
- increased demand for high-tech industrial via business parks, with a separation of the warehousing function (Nevill, 2006b)
- impact of resources boom in Queensland and Western Australia (CBRE, 2006)
- location close to efficient transportation infrastructure (CBRE, 2006; JLL, 2005; Nevill, 2006a)
- design of industrial property to individual tenant/user specifications (CBRE; 2006)
- land banking in growth corridors by institutional investors and property developers (CBRE, 2006),

with major companies in Sydney having recently relocated to take advantage of these new industrial growth areas in outer western Sydney; these major companies include Coca Cola, Coles, Woolworths, Cadbury Schweppes, LG Electronics and TNT Logistics (JLL, 2005).

In addition to changing user requirements, changing industrial construction requirements and increased technology demands, improved transportation infrastructure resulting in distribution centres and storages facilities being close to major transport hubs has been a key driver in these structural changes for industrial property in growth corridors in the major Australian capital cities. Table 1 lists some of these major infrastructure developments that have contributed to the development of these industrial growth corridors in Sydney and Melbourne; being achieved by significantly enhanced road, rail, port and inter-modal terminal facilities.

Table 1: Major transport infrastructure developments

Sydney:

Road: M4, M5, M7

Rail: South Sydney Freight Line

Port: Port Botany expansion

Inter-modal terminals: Minto

Melbourne:

Road: Western Ring Road, CityLink, Craigieburn Freeway

Port: Port Melbourne Channel Deepening

Rail: Dynon-Port Rail Link

Inter-modal terminals: Dynon

Sources: CBRE (2006), Colliers International (2006), JLL (2005)

All of the above factors have contributed to the continued strong demand for industrial property in Australia, with industrial land values in Sydney increasing by 10%-15% p.a. over the last ten years (JLL, 2005). Over \$1.6 billion in industrial property sales in Australia occurred in 2005-2006 (CBRE, 2006); largely in Sydney (40%) and Melbourne (27%), with an additional 3.8 million m² of industrial property stock becoming available in 2006 (CBRE, 2006).

Role of institutional investors

Industrial property has taken on increased importance in institutional property portfolios in recent years via a wide range of property investment vehicles; particularly listed property trusts and wholesale property funds. Table 2 provides details of the major industrial property investors in Australia, with over 1,250 industrial properties valued at over \$17.9 billion in 68 property funds, including both sector-specific and diversified property portfolios (PIR, 2006). Institutional investors are estimated to own approximately 40% of industrial property in Australia (Higgins, 2005, 2006), with Table 3 listing the major industrial properties held in Australian institutional property portfolios.

Table 2: Major industrial property investors: June 2006

Investor type	Portfolio value
LPT: industrial	
Macquarie Goodman	\$4,900M
ING Industrial Trust	\$2,398M
Macquarie ProLogis Trust	\$1,993M
JF US Industrial Trust	\$597M
LPT: diversified⁽¹⁾	
DB RREEF	\$2,327M
Stockland	\$754M
GPT	\$365M
Mirvac	\$128M
Valad	\$126M
Wholesale property funds: industrial	
APPF-Industrial	\$258M
Colonial FS Direct-Industrial	\$196M
Macquarie Goodman Wholesale Fund	\$1,239M
Macquarie Goodman Wholesale Fund (HK)	\$800M
Wholesale property funds: diversified⁽¹⁾	
AMP Australian Core Property	\$307M
AMP Property Income Fund	\$223M
Deutsche Wholesale Direct Property	\$104M
Colonial FS Private Property Syndicate	\$101M
ISPT Core Fund	\$287M
Property syndicates	
Australian Unity (3 funds)	\$140M
Becton	\$132M
Investa (2 funds)	\$116M
Unlisted property funds	
Westpac	\$203M
APN	\$221M

Sources: PIR (2006) and selected 2005-2006 annual reports

⁽¹⁾ Only contribution by industrial properties to diversified portfolio is shown

Table 3: Major industrial properties in Australian institutional portfolios⁽¹⁾

Industrial property	Property value
Yennora Distribution Centre	\$255M
Parkwest Industrial Estate	\$168M
Portair Industrial Estate	\$156M
Lidcombe Business Park	\$150M
MFive Industry Park	\$132M
Rosehill Industrial Estate	\$127M
Campus Business Park, Homebush	\$125M
Port Melbourne Industrial Estate	\$102M
Slough Industrial Estate	\$101M
Millennium Court Industrial Estate	\$100M
Clayton Business Park	\$88M
IBC Business Estate	\$88M
Binary Centre	\$81M
Discovery Cove Industrial Estate	\$80M
St Leonards Corporate Centre	\$79M
Greystanes Park West	\$75M
Chullora Business Park	\$64M
Microsoft Campus	\$64M

Source: Selected 2005-2006 annual reports

⁽¹⁾ Does not include international properties

In particular, the LPT sector is the major contributor to industrial property investment in Australia, having over \$13.7 billion in industrial property assets in both significant Australian and international industrial property portfolios, representing 10% of LPT total property assets (PIR, 2006). Major industrial LPTs include Macquarie Goodman (\$4.9 billion in total property assets) being the 4th largest LPT in Australia² and ING Industrial (\$2.4 billion), as well as the 100% US industrial property LPTs (Macquarie ProLogis and JF US Industrial). Industrial property also makes major contributions to the leading diversified LPTs, including DB RREEF (\$2.3 billion in industrial property from \$7.2 billion in total property assets, representing 32% of portfolio) and Stockland (\$754 million in industrial property from \$7.2 billion in total property assets, representing 10% of portfolio).

Similarly, wholesale property funds have significant industrial property assets (see Table 2), having over \$3.5 billion in industrial property in Australia and internationally, and providing the major source of direct property exposure for superannuation funds in Australia. This industrial property exposure is achieved through sector-specific wholesale property funds (eg: Macquarie Goodman Wholesale Fund (\$1.2 billion), APPF-Industrial (\$258 million)) and diversified wholesale property funds (eg: AMP Australian Core

² Largest US industrial REITs are Prologis (US\$11.9 billion market cap; 4th largest US REIT) and AMB Property (US\$4.2 billion) (NAREIT, 2006)

Property (8% industrial), ISPT Core Fund (8% industrial) and AMP Property Income Fund (27% industrial)). Macquarie Goodman have been particularly active, establishing two new wholesale industrial property funds (one Australian industrial property, one Hong Kong industrial property) in 2006 with total industrial property assets of over \$2 billion. Smaller investors seeking direct industrial property exposure are able to utilise property syndicates and unlisted property funds; see Table 2.

Given their property investment stature, institutional investors have been active in acquiring industrial properties in Australia; particularly in the new industrial growth corridors (eg: outer western Sydney) with improved infrastructure support. Leading institutional investors recently enhancing their industrial property exposure include Macquarie Goodman, ING Industrial, Mirvac, Stockland, AMP, GPT and Valad. This increased institutional investor interest and the limited industrial stock available has seen significant yield compression in the industrial property sector; current investment yields being 7.4% in Sydney and Melbourne (JLL, 2006a), as well as industrial land banking by both institutional investors and property developers in these industrial property growth corridors.

This reflects a strategic managing of the LPTs' asset allocations, as well as a desire to warehouse or create stock for new managed investment vehicles for their industrial property. This is amply reflected in the recent creation of unlisted wholesale property funds that have sourced properties from existing LPTs held by the fund manager. This trend is expected to increase with the increased appetite for property by many of the Australian superannuation funds, which now have total assets in excess of \$1 trillion.

Performance of industrial property

To further reinforce the significance of industrial property in Australia, Table 4 presents the average annual returns for one, three, five and ten year holding periods for the various asset classes at Q2:2006. Both direct industrial property and industrial LPTs figure prominently in this performance analysis, consistently being amongst the best-performed asset classes over this ten-year period; particularly industrial LPTs which gave the highest returns for each of the LPT sectors at 1, 3, 5 and 10 years. This strong performance by industrial property in Australia has also been evident for US, UK and New Zealand industrial property in recent years; see Table 5.

Table 4: Asset class performance: Australia: Q2:2006

Asset class	Average annual return (%) ⁽¹⁾			
	1Y	3Y	5Y	10Y
Direct property	15.3%	13.5%	12.2%	11.2%
Office	14.3% (3)	10.3% (3)	9.3% (3)	9.5% (3)
Retail	16.3% (1)	16.0% (1)	14.6% (1)	12.4% (2)
Industrial	14.4% (2)	13.5% (2)	13.3% (2)	13.6% (1)
LPTs	18.1%	17.9%	16.2%	14.8%
Office	18.1% (2)	14.4% (3)	12.0% (3)	11.5% (3)
Retail	7.9% (3)	18.5% (2)	17.1% (2)	16.4% (2)
Industrial	40.0% (1)	30.2% (1)	25.5% (1)	19.6% (1)
Shares	24.2%	23.8%	12.4%	12.8%
Bonds	2.8%	5.3%	5.9%	7.2%

Sources: IPD/PCA (2006), UBS(2006)

⁽¹⁾ Rank amongst property sectors and LPTs per time period given in brackets**Table 5: Industrial property performance: US, UK and NZ**

Asset class	Average annual return (%) ⁽¹⁾		
	1Y	3Y	5Y
Panel A: US: Q4: 2005			
Direct property	20.06%	14.43%	11.40%
Office	19.46% (3)	12.24% (3)	9.07% (3)
Retail	19.98% (2)	20.00% (1)	15.97% (1)
Industrial	20.31% (1)	13.42% (2)	11.22% (2)
REITs	12.17%	26.49%	19.07%
Shares	4.93%	14.40%	0.55%
Bonds	2.37%	3.74%	6.11%
Panel B: UK: Q4: 2005			
Direct property	19.10%	16.00%	12.80%
Office	20.30% (1)	12.60% (3)	9.70% (3)
Retail	18.90% (2)	18.30% (1)	14.80% (1)
Industrial	18.40% (3)	15.50% (2)	13.00% (2)
Shares	22.00%	18.50%	2.20%
Bonds	7.40%	5.20%	6.00%
Panel C: NZ: Q3: 2006			
Direct property			
Office	23.49% (1)	18.58% (1)	14.34% (3)
Retail	19.38% (2)	17.33% (2)	14.92% (1)
Industrial	15.01% (3)	16.94% (3)	14.57% (2)

Source: Authors' compilation from NCREIF (2006), IPD (2006), IPD/PCNZ (2006)

⁽¹⁾ Rank amongst property sectors per time period given in brackets for each country

Over 1985-2005 in Australia, industrial property has been the best performed property sector in 48% of these 21 years, compared to retail property (33% of years) and office property (19% of years), as well as industrial property being the worst performed property sector in only 19% of years. Industrial property also outperformed shares in 52% of years over this 21-year period of 1985-2005 (IPD/PCA, 2006). The future outlook for industrial property in Australia is also positive, reflected in the strong economic outlook and the strong current investor sentiment for industrial property in both the short-term and medium-term; particularly for high-tech industrial and prime industrial property (JLL, 2006b).

Previous Australian industrial property research

Previous research has also confirmed the strategic contribution that industrial property in Australia makes to an investment portfolio. In particular, industrial property has been shown to be a hedge against actual and expected inflation over 1985-1995 (Newell, 1996), as well as industrial property risk being marginally less affected by valuation-smoothing compared to office property risk and retail property risk (Newell and MacFarlane, 1998). Industrial property has also been shown to have significant portfolio diversification benefits and mixed-asset portfolio diversification benefits; being the best-performed property sector on a risk-adjusted basis in more recent years (Newell, 2005).

Similarly, industrial LPT performance did not exhibit a Granger-causality relationship to industrial property performance over 1985-1994 (Newell and MacFarlane, 1996), as well as there not being a “pure” property factor in industrial property and industrial LPTs (Newell and MacFarlane, 1996); highlighting the unique characteristics of direct industrial property and industrial LPTs as separate property investment vehicles. With property sector and geographic diversification being seen to be equally effective diversification strategies for LPTs in Australia, this has further reinforced the significance and contribution of sector-specific LPTs, including industrial LPTs (eg: Macquarie Goodman) which utilise geographic diversification as their diversification strategy (Newell and Tan, 2003). Fractional interests have also been shown to be an effective risk management strategy for LPTs seeking international industrial property exposure via joint venture arrangements (eg: Macquarie ProLogis) (Newell and Tan, 2005). Industrial LPT risk levels have decreased in recent years, as well as industrial LPTs having enhanced portfolio diversification benefits in a LPT sub-sector portfolio and in a mixed-asset portfolio (Newell, 2006).

The above has confirmed the stature, significance, contribution and performance of industrial property in Australia in a property portfolio context and mixed-asset portfolio context. The following sections will extend this previous analysis and critically assess the performance of industrial property for industrial property type, size, value and geographic region in Australia over Q3:1995-Q2:2006, and their strategic role in a property portfolio and mixed-asset portfolio in Australia.

METHODOLOGY

Data series

Quarterly total returns were obtained for Q3:1995-Q2:2006 using the IPD/PCA property indices (IPD/PCA, 2006). The IPD/PCA property indices are the benchmark commercial property series for Australia, comprising 694 properties valued at \$72.4 billion at June 2006. Full details of the IPD/PCA property index portfolio at June 2006 are given in Table 6, with industrial property accounting for 184 properties valued at \$4.5 billion, representing 6.3% of the IPD/PCA property index portfolio³. A comparison of the performance of the office, retail and industrial property sectors over Q3:1995-Q2:2006 is given in Figure 1. Q3:1995 is the start date for these analyses, as prior to Q3:1995 the IPD/PCA property indices were only available on a six-monthly basis.

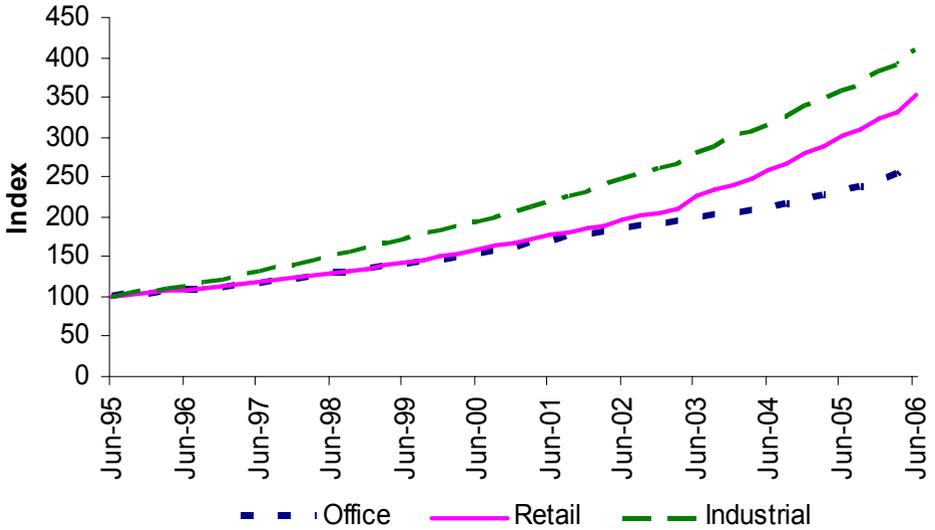
Table 6: IPD/PCA property index portfolio: June 2006

Property sector	Number of properties	Portfolio value
Total	694	\$72.4B
Office	227	\$28.4B
Retail	260	\$38.9B
Industrial	184	\$4.5B
Industrial: type		
Unit estate	27	\$1.2B
High-tech	31	\$1.1B
Warehouse	90	\$1.2B
Distribution	31	\$0.9B
Industrial: size (NLA)		
<7K m ²	47	\$0.3B
7K-12K m ²	41	\$0.6B
12K-25K m ²	64	\$1.5B
>25K m ²	32	\$2.2B
Industrial: value		
<\$6M	24	\$0.1B
\$6M-\$11M	36	\$0.3B
\$11M-\$20M	55	\$0.8B
>\$20M	68	\$3.3B
Industrial: region		
Sydney	112	\$3.2B
Melbourne	38	\$0.8B
Brisbane	22	\$0.3B

Source: IPD/PCA (2006)

³ Equivalent level of industrial property in other international property performance series are US NCREIF (18.6%) and UK IPD (16.0%)

Figure 1: Comparison of direct property sectors: Q3:1995-Q2:2006



Source: IPD/PCA (2006)

The Australian property sectors assessed were:

- total property
- property sub-sectors: office, retail, industrial property
- industrial property types⁴: unit estate, high-tech, warehouse, distribution
- industrial property size: <7,000m², 7,000-12,000m², 12,000-25,000m², >25,000m²
- industrial property value: <\$6M, \$6M-\$11M, \$11M-\$20M, >\$20M
- industrial property geographic regions: Sydney, Melbourne, Brisbane,

as well as the asset classes for:

- listed property trusts: total, office, retail, industrial, diversified LPTs
- shares: ASX300
- bonds: All Maturities government bonds (IPD/PCA, 2006; UBS, 2006).

⁴ Unit estate is a warehouse development with an office component, 3 or more tenants with typically below 2,000 m² lettable area each. High-tech is medium, flexible industrial space usually located in a specialised precinct, accommodating research and development/laboratory areas, with a floor area of 2,000 m²-10,000 m² and an office component of 40%-70%. Warehouse is investment grade industrial space located in an industrial precinct, involving individual buildings with lettable area of 2,000 m²-10,000 m² and an office component of 10%-25%. Distribution centre is conventional warehouse stock greater than 20,000 m² in size, accessible to road networks, with an internal clearance of at least 8 metres and with an office component of less than 5% (CBRE, 2006; IPD/PCA, 2006).

Statistical analysis

Risk-adjusted performance analysis and inter-asset correlation analysis were carried out to assess the performance and portfolio diversification benefits for industrial property and industrial LPTs in a mixed-asset portfolio over Q3:1995-Q2:2006. Sub-period analyses were also conducted over Q3:1995-Q4:2000 and Q1:2001-Q2:2006 to assess the changing dynamics of industrial property performance. The presence of a “pure” property factor and Granger causality tests were also used to assess the linkages between indirect industrial property and direct industrial property performance.

RESULTS AND DISCUSSION

Performance analysis

Table 7 presents the risk-adjusted performance for industrial property, industrial LPTs and the other property sectors and major asset classes over Q3:1995-Q2:2006. Overall, industrial LPTs gave the highest average annual returns (18.56% p.a.) and industrial property was third-best performed (13.68% p.a.). Both industrial property and industrial LPTs delivered strong risk-adjusted returns, both being the best performed amongst the direct property and LPT sectors respectively; in each case, outperforming the equivalent retail and office sectors. Whilst industrial LPT risk was above that seen for overall LPT sector risk and stockmarket risk, this was offset by higher average annual returns and the resulting highest risk-adjusted returns over this 11-year period. Industrial LPTs outperformed industrial property over this period; this indirect/direct property trend also being evident for the retail and office property sectors.

Table 7: Industrial property performance analysis: Q3: 1995-Q2: 2006

Asset class	Average annual return	Annual risk	Sharpe index ⁽¹⁾
Total property	10.87%	1.44%	3.70
Office	9.20%	1.32%	2.77 (3)
Retail	12.10%	2.25%	2.92 (2)
Industrial	13.68%	1.46%	5.60 (1)
LPTs	13.62%	7.92%	1.02
Office	11.09%	7.59%	0.73 (4)
Retail	14.75%	9.70%	0.95 (2)
Industrial	18.56%	11.18%	1.17 (1)
Diversified	13.11%	9.44%	0.80 (3)
Shares	12.87%	10.87%	0.68
Bonds	7.20%	4.28%	0.39

⁽¹⁾ Rank amongst property sectors and LPTs given in brackets

To assess individual property sub-sector performance, Table 8 presents the risk-adjusted performance by industrial property type, size, value and geographic region over Q3:1995-Q2:2006. On a risk-adjusted basis, all industrial sub-sectors outperformed the stockmarket, with clear differences in the risk-adjusted performance between the various industrial property types, sizes, values and geographic regions. This reflects the need to critically assess the industrial property types, sizes, values and geographic regions in developing an overall industrial property portfolio investment strategy. In particular, the best performed sectors on a risk-adjusted basis were high-tech industrial property and Sydney industrial property, with less differentiation in performance concerning size or value except for the smaller, lesser value industrial properties.

Table 8: Industrial property sub-sector performance: Q3: 1995-Q2: 2006

Industrial property sub-sector	Average annual return	Annual risk	Sharpe index⁽¹⁾
Industrial	13.68%	1.46%	5.60
Type			
Unit estate	14.72%	2.57%	3.58 (3)
High-tech	13.35%	1.61%	4.85 (1)
Warehouse	13.71%	2.21%	3.70 (2)
Distribution	11.01%	2.93%	1.87 (4)
Size			
<7K m ²	14.20%	2.84%	3.06 (4)
7K-12K m ²	13.25%	1.58%	4.88 (1)
12K-25K m ²	13.35%	1.71%	4.57 (3)
>25K m ²	13.96%	1.78%	4.75 (2)
Value			
<\$6M	11.60%	2.38%	2.54 (4)
\$6M-\$11M	13.44%	1.65%	4.79 (2)
\$11M-\$20M	13.77%	1.61%	5.13 (1)
>\$20M	13.85%	1.85%	4.49 (3)
Geographic region			
Sydney	13.97%	1.73%	4.88 (1)
Melbourne	13.30%	2.79%	2.78 (2)
Brisbane	12.82%	2.99%	2.43 (3)
Shares	12.87%	10.87%	0.68

⁽¹⁾ Rank amongst individual property sub-sectors given in brackets

Portfolio diversification

To assess the portfolio diversification benefits of industrial property, Table 9 presents the inter-asset correlation matrix over Q3:1995-Q2:2006. Industrial property and industrial LPTs were not significantly correlated with the stockmarket ($r = 0.16$ and $r = 0.25$ respectively), with industrial property also showing diversification benefits with the other property sectors in a property portfolio, particularly with office property ($r = 0.26$). Industrial property and industrial LPTs were significantly correlated ($r = 0.32$), being the largest correlation between the respective indirect and direct property markets (ie: office ($r = 0.09$), retail ($r = 0.07$)). This reflects some degree of common investment performance between industrial LPTs and direct industrial property, but with some evidence of different investment dynamics and structure as being distinguishable industrial property investment vehicles in Australia over the last ten years.

Table 9: Inter-asset correlation matrix: Q3:1995-Q2:2006

	Total property	Office property	Retail property	Industrial property	LPTs	Office LPTs	Retail LPTs	Industrial LPTs	Diversified LPTs	Shares	Bonds
Total	1.00										
property											
Office	0.65*	1.00									
property											
Retail	0.89*	0.25	1.00								
property											
Industrial	0.51*	0.26	0.46*	1.00							
property											
LPTs	0.19	0.14	0.11	0.21	1.00						
Office	0.15	0.09	0.11	0.24	0.70*	1.00					
LPTs											
Retail	0.12	0.04	0.07	0.12	0.88*	0.42*	1.00				
LPTs											
Industrial	0.38*	0.21	0.32*	0.32*	0.77*	0.71*	0.53*	1.00			
LPTs											
Diversified	0.08	0.17	-0.02	0.11	0.91*	0.65*	0.67*	0.68*	1.00		
LPTs											
Shares	0.13	0.07	0.10	0.14	0.20	0.32*	0.11	0.25	0.18	1.00	
Bonds	-0.13	-0.11	-0.13	0.00	0.49*	0.36*	0.45*	0.33*	0.46*	-0.20	1.00
Inflation	0.11	0.17	0.08	-0.18	-0.15	-0.09	-0.27	-0.01	-0.03	-0.11	-0.27

*: significant correlation (P<5%)

Table 10 presents the inter-asset correlation matrix for the industrial property sub-sectors over Q3:1995-Q2:2006. All industrial property sub-sectors were not correlated with the stockmarket, with correlations ranging from $r = -0.28$ to $r = 0.20$. An industrial property diversification strategy based on industrial property type ($r = -0.29$ to $r = 0.51$; average correlation of 0.13) and geographic diversification ($r = 0.11$ to $r = 0.24$; average correlation of 0.18) were seen to be more effective than a diversification strategy based on industrial property size ($r = 0.33$ to $r = 0.63$; average correlation of 0.45) or industrial property value ($r = -0.09$ to $r = 0.57$; average correlation of 0.30). The significant role of geographic diversification in an industrial property investment strategy supports the success of this strategy implemented by the industrial sector-specific LPTs (eg: Macquarie Goodman, ING Industrial) and industrial wholesale funds (eg: APPC-Industrial, Colonial First State Direct-Industrial).

Table 10: Industrial property sub-sector correlation matrix: Q3:1995-Q2:2006

	Total property	Industrial property	Unit estate	High-tech	Warehouse	Distribution	<7K m ²	7K-12K m ²	12K-25K m ²	>25K m ²	<\$6M	\$6M-\$11M	\$11M-\$20M	>\$20M	Sydney	Melbourne	Brisbane	Shares	
Total property	1.00																		
Industrial property	0.51*	1.00																	
Unit estate	0.17	0.81*	1.00																
High-tech	0.41*	0.68*	0.51*	1.00															
Warehouse	0.52*	0.71*	0.51*	0.40*	1.00														
Distribution	0.22	-0.06	-0.29	-0.20	-0.14	1.00													
<7K m ²	0.37*	0.60*	0.39*	0.37*	0.62*	-0.18	1.00												
7K-12K m ²	0.13	0.74*	0.69*	0.40*	0.42*	-0.07	0.48*	1.00											
12K-25K m ²	0.60*	0.76*	0.62*	0.74*	0.61*	-0.15	0.41*	0.37*	1.00										
>25K m ²	0.35*	0.89*	0.73*	0.50*	0.56*	0.06	0.33*	0.63*	0.47*	1.00									
<\$6M	0.07	0.35*	0.28	0.08	0.26	-0.01	0.49*	0.42*	-0.02	0.36*	1.00								
\$6M-\$11M	0.28	0.72*	0.63*	0.36*	0.52*	-0.15	0.62*	0.72*	0.44*	0.58*	0.34*	1.00							
\$11M-\$20M	0.31*	0.55*	0.34*	0.35*	0.53*	0.08	0.48*	0.35*	0.59*	0.35*	-0.09	0.35*	1.00						
>\$20M	0.46*	0.94*	0.83*	0.69*	0.61*	-0.07	0.42*	0.67*	0.69*	0.90*	0.33*	0.57*	0.29	1.00					
Sydney	0.24	0.89*	0.88*	0.68*	0.52*	-0.24	0.51*	0.70*	0.68*	0.79*	0.37*	0.65*	0.43*	0.88*	1.00				
Melbourne	0.58*	0.47*	0.19	0.30*	0.44*	0.16	0.39*	0.35*	0.38*	0.37*	0.05	0.38*	0.25	0.41*	0.11	1.00			
Brisbane	0.43*	0.39*	0.17	0.19	0.38*	0.16	0.17	0.25	0.42*	0.33*	0.12	0.34*	0.36*	0.27	0.18	0.24	1.00		
Shares	0.13	0.14	0.16	0.14	0.09	-0.28	0.06	0.20	0.17	0.05	-0.18	0.05	0.11	0.09	0.12	0.13	0.19	1.00	
Inflation	0.11	-0.18	-0.27	-0.26	-0.17	0.23	-0.09	-0.15	-0.12	-0.18	-0.09	-0.16	-0.03	-0.21	-0.30	0.16	-0.00	-0.11	

*: significant correlation (P<5%)

Linkages between direct and indirect industrial property markets

A range of techniques are available to assess the linkages between the direct industrial property market and the indirect (LPT) industrial property market in Australia over Q3:1995-Q2:2006. Firstly, the presence of a common “pure” property factor in the direct and indirect industrial property returns was assessed using the procedure of Giliberto (1990), which strips out the stockmarket and bond effects from both property series and correlates the resulting property residuals. A significant common “pure” property factor was evident for the indirect/direct industrial property sectors ($r = 0.31$), with this common pure property factor not being evident for either office property ($r = 0.12$) or retail property ($r = 0.13$); further supporting the link between the performance of industrial LPTs and industrial property. The presence of a common pure property factor in the industrial property sub-sectors was most evident for geographic region (average correlation of 0.27) and industrial property type (average correlation of 0.23), and less evident for industrial property size (average correlation of 0.21) and industrial property value (average correlation of 0.13).

To further assess the linkage between the industrial property market and industrial LPTs, Granger causality tests (lag of four quarters) were applied. No evidence of Granger causality was evident between industrial LPTs and the various industrial property sub-sectors (industrial type, size, value and region) in either direction, with this lack of Granger causality also being found for the equivalent analyses for the indirect/direct office property and retail property sectors. These Granger causality results reflect the separation and distinctive characteristics of the industrial LPT and direct industrial property markets over this period of Q3:1995-Q2:2006. This period particularly coincides with the significant growth and maturity of the industrial LPT sector which has increased its market capitalisation from only \$520 million to \$10.3 billion over this eleven year period ; increasing from only 4.0% of the ASX LPT 300 market capitalisation to 11.6% over this period (UBS, 2006).

Sub-period analysis

To assess the potential changing dynamics of the industrial property market in Australia, the full period of Q3:1995-Q2:2006 was broken into the two sub-periods of Q3:1995-Q4:2000 and Q1:2001-Q2:2006.

Table 11 presents the industrial property sub-period performance analysis. Industrial property has shown consistent risk-adjusted performance over these two sub-periods, being the best-performed property sector on a risk-adjusted returns basis in both sub-periods. Similarly, industrial LPTs were the best-performed LPT sector in both sub-periods on a risk-adjusted basis. Both industrial property and industrial LPTs outperformed the stockmarket in both sub-periods.

Table 11: Industrial property sub-period performance analysis: Q3:1995-Q2:2006

Asset class	Q3: 1995-Q4: 2000			Q1: 2001-Q2: 2006		
	Average annual return	Annual risk	Sharpe index ⁽¹⁾	Average annual return	Annual risk	Sharpe index ⁽¹⁾
Total property	9.72%	0.85%	4.52	12.03%	1.71%	3.99
Office	9.09%	1.14%	2.81 (3)	9.31%	1.51%	2.74 (3)
Retail	9.29%	1.08%	3.75 (2)	14.32%	2.65%	3.44 (2)
Industrial	14.11%	1.12%	7.31 (1)	13.25%	1.73%	4.66 (1)
LPTs	12.00%	8.59%	0.71	15.26%	7.33%	1.37
Office	10.42%	7.18%	0.63 (3)	11.76%	8.14%	0.81 (4)
Retail	13.73%	10.29%	0.76 (2)	15.79%	9.29%	1.14 (2)
Industrial	13.47%	9.72%	0.78 (1)	23.89%	12.24%	1.53 (1)
Diversified	11.75%	9.94%	0.59 (4)	14.48%	9.11%	1.02 (3)
Shares	12.66%	9.24%	0.73	13.08%	12.51%	0.63
Bonds	9.02%	4.71%	0.67	5.41%	3.69%	0.06

⁽¹⁾ Rank amongst property sectors and LPTs given in brackets

The industrial property sub-sector sub-period performance analysis is given in Table 12. Consistent risk-adjusted returns were generally seen for the various industrial property sub-sectors across these two sub-periods; consistently out-performing shares on a risk-adjusted basis in both sub-periods. High-tech industrial property and Sydney industrial property were the best-performed industrial property type and geographic region respectively in both sub-periods, with some variability in performance by size and value across these two sub-periods. Overall, these sub-period analyses reaffirm the strong risk-adjusted performance of industrial property and industrial LPTs, as well as for the various industrial property sub-sectors.

Table 12: Industrial property sub-sector sub-period performance analysis: Q3:1995-Q2:2006

Industrial property sub-sector	Q3: 1995-Q4: 2000			Q1: 2001-Q2:2006		
	Average annual return	Annual risk	Sharpe index ⁽¹⁾	Average annual return	Annual risk	Sharpe index ⁽¹⁾
Industrial	14.11%	1.12%	7.31	13.25%	1.73%	4.66
Type						
Unit estate	16.18%	2.39%	4.32 (3)	13.28%	2.63%	3.08 (4)
High-tech	13.83%	1.58%	5.05 (1)	12.87%	1.65%	4.64 (1)
Warehouse	14.07%	1.74%	4.70 (2)	13.36%	2.64%	3.10 (3)
Distribution	10.57%	2.87%	1.64 (4)	12.98%	2.37%	3.29 (2)
Size						
<7K m ²	15.28%	2.83%	3.32 (4)	13.13%	2.82%	2.81 (4)
7K-12K m ²	13.59%	1.47%	5.23 (3)	12.90%	1.70%	4.54 (1)
12K-25K m ²	13.77%	1.36%	5.80 (1)	12.94%	2.02%	3.84 (3)
>25K m ²	14.28%	1.47%	5.72 (2)	13.64%	2.06%	4.10 (2)
Value						
<\$6M	12.40%	2.33%	2.79 (4)	10.81%	2.44%	2.31 (4)
\$6M-\$11M	13.94%	1.19%	6.75 (1)	12.95%	2.01%	3.85 (2)
\$11M-\$20M	14.52%	1.63%	5.29 (2)	13.02%	1.54%	5.08 (1)
>\$20M	14.12%	1.67%	4.95 (3)	12.20%	2.70%	2.60 (3)
Region						
Sydney	15.29%	1.62%	5.80 (1)	12.66%	1.65%	4.52 (1)
Melbourne	11.09%	2.03%	2.57 (2)	15.56%	3.11%	3.34 (2)
Brisbane	12.08%	2.58%	2.40 (3)	13.57%	3.39%	2.48 (3)
Shares	12.66%	9.24%	0.73	13.08%	12.51%	0.63

⁽¹⁾ Rank amongst industrial property sub-sectors given in brackets

The impact of changing portfolio diversification benefits by industrial property is shown in Table 13. Industrial property performance has become more correlated with stockmarket performance; this correlation increasing from $r = -0.01$ to $r = 0.22$, with this trend to an increasing correlation with the stockmarket also evident for retail property ($r = -0.21$ to $r = 0.20$) and office property ($r = 0.00$ to $r = 0.10$). The property sectors overall have also become increasingly aligned over this period, with the average property sector correlation increasing from $r = 0.15$ to $r = 0.45$. Similarly, industrial LPTs have become more highly correlated with the stockmarket ($r = 0.18$ to $r = 0.30$), as well as industrial LPT performance more strongly aligning with direct industrial property performance ($r = -0.09$ to $r = 0.59$). This significant increase in correlation between industrial LPTs and industrial property has been a steady increase in aligned investment performance since 2003, increasing from a correlation of $r = -0.15$ in 2003 to $r = 0.55$ in 2006; see Figure 2

for rolling 5-year correlations over Q3:1995-Q2:2006; reflecting consistent strong performance by both industrial property and industrial LPTs in recent years.

Table 13: Industrial property sub-sector correlation matrices: Q3:1995-Q2:2006

Panel A: Q3: 1995-Q4: 2000

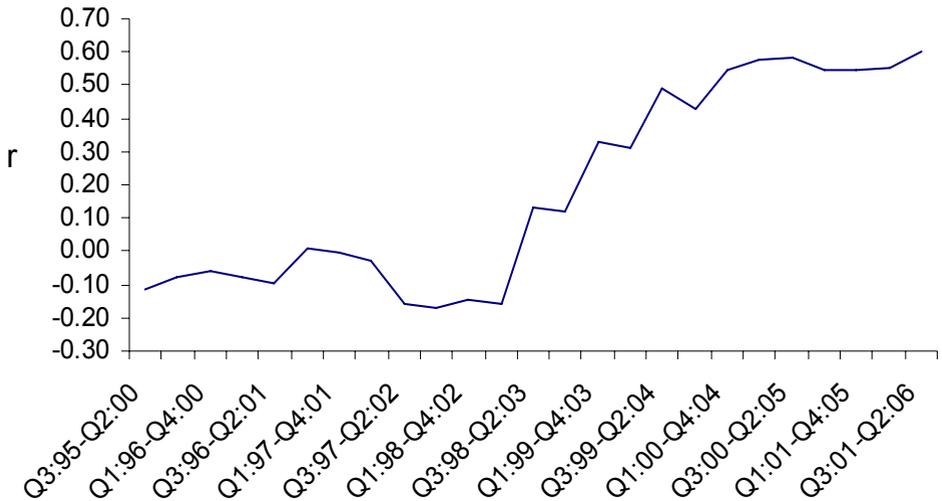
	Total property	Office property	Retail property	Industrial property	LPTs	Industrial LPTs	Shares
Total property	1.00						
Office property	0.88*	1.00					
Retail property	0.69*	0.24	1.00				
Industrial property	0.21	0.11	0.10	1.00			
LPTs	-0.07	0.15	-0.33	-0.11	1.00		
Industrial LPTs	-0.26	-0.13	-0.28	-0.09	0.79*	1.00	
Shares	-0.11	-0.00	-0.21	-0.01	0.15	0.18	1.00
Inflation	0.02	-0.07	0.20	-0.32	-0.17	-0.15	-0.19

Panel B: Q1: 2001-Q2: 2006

	Total property	Office property	Retail property	Industrial property	LPTs	Industrial LPTs	Shares
Total property	1.00						
Office property	0.64*	1.00					
Retail property	0.91*	0.28	1.00				
Industrial property	0.74*	0.34*	0.74*	1.00			
LPTs	0.33*	0.13	0.28	0.50*	1.00		
Industrial LPTs	0.58*	0.41*	0.45*	0.59*	0.78*	1.00	
Shares	0.22	0.10	0.20	0.22	0.25	0.30*	1.00
Inflation	0.09	0.44	-0.09	0.04	-0.10	0.12	-0.12

*: significant correlation (P<5%)

Figure 2: Industrial property versus industrial LPTs: correlation dynamics⁽¹⁾



⁽¹⁾ Correlations calculated over rolling 5-year periods (quarter)

For the industrial property sub-sector correlations shown in Table 14, the correlations for each of the categories within the industrial property sub-sectors have significantly increased recently; namely:

- property type: $\bar{r} = -0.01$ increasing to $\bar{r} = 0.27$
- size: $\bar{r} = 0.32$ increasing to $\bar{r} = 0.54$
- value: $\bar{r} = 0.18$ increasing to $\bar{r} = 0.35$
- region: $\bar{r} = -0.01$ increasing to $\bar{r} = 0.42$,

with industrial property type still continuing to provide the most property diversification benefits; however, most loss of property diversification benefits was evident for the geographic regions.

In addition, the correlations with the stockmarket have also significantly increased in recent years; namely:

- property type: $\bar{r} = -0.16$ increasing to $\bar{r} = 0.14$
- size: $\bar{r} = -0.01$ increasing to $\bar{r} = 0.20$
- value: $\bar{r} = -0.06$ increasing to $\bar{r} = 0.18$
- region: $\bar{r} = 0.01$ increasing to $\bar{r} = 0.23$.

Table 14: Industrial property sub-sector correlation matrix

Panel A: Q3: 1995- Q4: 2000	Industrial property	Unit estate	High- tech	Warehouse	Distribution	<7K m ²	7K- 12K m ²	12K- 25K m ²	>25K m ²	<\$6M \$11M	\$6M- \$11M	\$11M- \$20M	>\$20M	Sydney	Melbourne	Brisbane	Shares	
Industrial property	1.00																	
Unit estate	0.68*	1.00																
High-tech	0.68*	0.52*	1.00															
Warehouse	0.33	0.16	0.21	1.00														
Distribution	-0.19	-0.53*	-0.39	-0.02	1.00													
<7K m ²	0.45*	0.06	0.35	0.59*	-0.20	1.00												
7K-12K m ²	0.80*	0.56*	0.61*	0.13	-0.13	0.22	1.00											
12K-25K m ²	0.66*	0.65*	0.77*	0.31	-0.44*	0.38	0.47*	1.00										
>25K m ²	0.81*	0.53*	0.33	0.09	0.02	0.04	0.62*	0.19	1.00									
<\$6M	0.66*	0.34	0.32	0.40	-0.12	0.51*	0.58*	0.19	0.59*	1.00								
\$6M-\$11M	0.70*	0.52*	0.42*	0.06	-0.15	0.13	0.68*	0.41	0.63*	0.44*	1.00							
\$11M-\$20M	0.15	-0.12	0.09	0.08	0.35	0.33	-0.01	0.38	-0.10	-0.26	-0.12	1.00						
>\$20M	0.91*	0.77*	0.67*	0.32	-0.28	0.25	0.76*	0.56*	0.80*	0.64*	0.60*	-0.20	1.00					
Sydney	0.90*	0.83*	0.70*	0.21	-0.49*	0.32	0.68*	0.73*	0.68*	0.46*	0.63*	0.02	0.90*	1.00				
Melbourne	0.35	-0.20	0.10	0.43*	0.33	0.43*	0.32	-0.03	0.34	0.62*	0.24	0.06	0.20	-0.06	1.00			
Brisbane	0.06	-0.07	-0.06	-0.20	0.21	-0.15	0.34	-0.23	0.24	0.10	0.14	0.17	-0.07	-0.11	0.13	1.00		
Shares	-0.00	0.08	0.12	-0.33	-0.52	-0.12	0.12	-0.12	0.07	-0.08	0.05	-0.32	0.10	0.10	-0.06	-0.00	1.00	
Inflation	-0.32	-0.36	-0.33	-0.26	0.16	-0.08	-0.27	-0.22	-0.28	-0.06	-0.28	0.03	-0.36	-0.38	0.09	0.05	-0.19	

*. significant correlation (p<5%)

Table 14: Industrial property sub-sector correlation matrix

Panel B: Q1: 2001- Q2: 2006	Industrial property	Unit estate	High- tech	Warehouse	Distribution	<7K m ²	7K- 12K m ²	12K- 25K m ²	>25K m ²	<\$6M	\$6M- \$11M	\$11M- \$20M	>\$20M	Sydney	Melbourne	Brisbane	Shares	
Industrial property	1.00																	
Unit estate	0.91*	1.00																
High-tech	0.47*	0.69*	1.00															
Warehouse	0.87*	0.73*	0.52*	1.00														
Distribution	0.07	0.02	0.06	-0.21	1.00													
<7K m ²	0.70*	0.65*	0.35	0.66*	-0.10	1.00												
7K-12K m ²	0.71*	0.80*	0.22	0.59*	0.01	0.69*	1.00											
12K-25K m ²	0.80*	0.61*	0.74*	0.74*	0.07	0.43*	0.31	1.00										
>25K m ²	0.93*	0.88*	0.62*	0.77*	0.12	0.54*	0.64*	0.60*	1.00									
<\$6M	0.15	0.18	-0.18	0.16	0.17	0.45*	0.26	-0.19	0.21	1.00								
\$6M-\$11M	0.72*	0.69*	0.32	0.70*	-0.12	0.93*	0.76*	0.44*	0.56*	0.27	1.00							
\$11M- \$20M	0.83*	0.71*	0.57*	0.86*	-0.12	0.60*	0.67*	0.75*	0.69*	0.00	0.63*	1.00						
>\$20M	0.96*	0.89*	0.68*	0.76*	0.10	0.50*	0.60*	0.75*	0.95*	-0.07	0.54*	0.71*	1.00					
Sydney	0.95*	0.91*	0.65*	0.75*	0.13	0.65*	0.74*	0.67*	0.93*	0.22	0.66*	0.77*	0.92*	1.00				
Melbourne	0.66*	0.63*	0.57*	0.54*	-0.08	0.55*	0.48*	0.66*	0.50*	-0.20	0.55*	0.60*	0.69*	0.51*	1.00			
Brisbane	0.50*	0.40	0.40	0.70*	0.11	0.47*	0.21	0.78*	0.40	0.17	0.46*	0.59*	0.42*	0.50*	0.25	1.00		
Shares	0.22	0.24	0.16	0.30	-0.13	0.19	0.25	0.32	0.05	-0.25	0.35	0.45*	0.15	0.17	0.22	0.30	1.00	
Inflation	0.04	0.00	0.02	-0.09	0.32	0.03	0.18	0.07	-0.03	-0.18	-0.02	0.05	0.39	0.00	0.30	-0.20	0.04	

*: significant correlation (P<5%)

Overall, these sub-period correlation analyses confirm some recent loss of portfolio diversification benefits by industrial property with the stockmarket in a mixed-asset portfolio, as well as less industrial property portfolio diversification benefits by industrial property type, size, value and region. Whilst these correlations are still generally low and reflect potential diversification benefits, all of these correlations have increased recently and reflect some loss of these property portfolio diversification benefits and mixed-asset portfolio diversification benefits. Industrial LPTs have also become more closely aligned to stockmarket performance and direct industrial property performance in recent years; reflecting some loss of diversification benefits by industrial LPTs.

PROPERTY INVESTMENT IMPLICATIONS

Industrial property is a significant property investment in Australia, with both direct industrial property and industrial LPTs making a significant contribution to institutional portfolios, accounting for over \$18 billion in industrial property assets in these institutional property funds. Structural change and strong performance regarding industrial property has seen industrial property in Australia receive increased institutional investor attention in recent years.

This paper has shown that both direct industrial property and industrial LPTs have delivered strong risk-adjusted returns over Q3:1995-Q2:2006; being the best performed direct property and LPT sectors respectively. This risk-adjusted performance by both industrial property and industrial LPTs has been consistent or has improved in more recent years. At an industrial property sub-sector level, there are clear investment performance differences between the sub-categories of industrial property type, size, value and geographic region; with high-tech industrial property and Sydney industrial property being consistently best-performed on a risk-adjusted basis. This clearly identifies the need to include the industrial property sub-sectors as a key element in an industrial property investment strategy by institutional investors in Australia.

Industrial property and industrial LPTs both showed strong portfolio diversification benefits, both in a property portfolio and in a mixed-asset portfolio; particularly at the sub-sector level involving industrial property type and geographic region. Whilst there has been some loss of portfolio diversification benefits by both direct industrial property and industrial LPTs in more recent years, portfolio diversification benefits are still significant for both types of industrial property investment. Similarly, whilst there has been a closer alignment between direct industrial property and industrial LPT performance in recent years, there are still unique differences that highlight their strategic roles as separate property investment vehicles.

Given the stature and significance of industrial property and the range of industrial property investment vehicles now available in Australia, this paper has significant property investment implications regarding the strategic role of industrial property in

portfolios. As well as highlighting the risk-adjusted performance and portfolio diversification benefits of industrial property, it has provided a fuller analysis of the role of industrial property type, size, value and geographic region in a portfolio. With clear differences between these four industrial property sub-sectors, it is important to recognise and implement these differences in developing an industrial property investment strategy. Both industrial property type and geographic region were seen to be most effective in terms of industrial property portfolio diversification, as well as both direct industrial property and industrial LPTs having sufficiently different performance characteristics to each make an important strategic contribution as unique property investment vehicles in an investment portfolio.

With the expected continued strong Australian economy, industrial property is expected to continue to be seen as an important property sector for both direct and indirect property investment. The increased capital inflows from superannuation, increased institutional investor interest and significant structural change in the industrial property sector are expected to see continued strong support for industrial property in a portfolio.

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