Asset Class Return Connectedness

During the Last Two Global Shocks GFC and Covid

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Abstract

Purpose

The present paper aims to explore the nature of this return connectedness among the asset classes (international equity, Australian equity, property) common among Australian individual investors along with standard safe haven gold during the last two global shocks.

Design/methodology/approach

Weekly price indices are used as proxies for the various asset classes and pairwise correlations are calculated over the various periods.

Findings

Consistent with previous literature, there appears to be more co-movements among the various asset classes during periods of global shocks. This seems to be more pronounced in the case of the Covid pandemic.

Originality/value

The present paper will be a significant contribution to literature as it will also compare the observed patterns between the two global shocks and provide additional insights that will be useful for portfolio managers and investment advisers in managing their diversification strategies during similar situations. It is also in the Australian context so any insights will be directly useful to investors and financial advisers in Australia.

Keywords: return connectedness, return co-movement, GFC, Covid

Introduction

One of the basic principles of investing is diversification consistent with the adage of not putting all of one's eggs in one basket. One level of diversification is in terms of asset classes (e.g. equity, property, fixed interest, cash) and financial advisers usually recommend certain asset allocations for various types of investors (Santacruz, 2016). While portfolio return is an important consideration, balancing it with portfolio risk through diversification is just as important. In Finance literature, risk is widely defined as variability of returns.

The mathematical basis for diversification can be inferred from the formula for calculating portfolio risk or variance of returns.

For a two-security portfolio:

$$\sigma_p^2 = w_1^2 \sigma_p^2 + w_1^2 \sigma_p^2 + 2w_1 w_2 \rho_{12} \sigma_1 \sigma_2$$

Where: $\sigma^2{}_p$ = portfolio variance or risk

w_1 = value of investment *1* out of the total value of portfolio

$\sigma^2{}_1$ = variance of security *1*

σ_1 = standard deviation of security *1*

w_2 = value of investment *2* out of the total value of portfolio

$\sigma^2{}_2$ = variance of security *2*

σ_2 = standard deviation of security *2*

ρ_{12} = correlation coefficient between security *1* and security *2*

As the correlation coefficient between two securities can only range from -1.0 (perfectly negatively correlated) to 1.0 (perfectly positively correlated), the formula indicates that greater reduction in portfolio variance can be realised by selecting securities whose returns do not move together.

The generalised formula for a portfolio consisting of n securities is as follows:

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i\, w_j \rho_{ij} \sigma_i \sigma_j$$

Where: $\sigma^2{}_p$ = portfolio variance or risk

w_i = value of investment *i* out of the total value of portfolio

σ_i = standard deviation of security *i*

w_j = value of investment *j* out of the total value of portfolio

σ_j = standard deviation of security *j*

ρ_{ij} = correlation coefficient between security *i* and security *j*

Again, greater reduction in portfolio variance can be realised by selecting securities with negative or low correlations. Needless to say, this is not the only consideration in constructing a portfolio, portfolio returns are also.

Intuitively, asset returns should tend to move together during periods of shocks to the economic and financial system. An analogy would be boats on a harbour representing the various asset classes. Each one would be moved up and down by the small waves differently depending on perhaps their size, orientation on the water, location on the harbour, etc. However, these small differences become less

significant when a tidal wave, representing a financial shock, comes. When this happens, the boats seemingly move in unison.

Such co-movements or asset class return connectedness will have implications on diversification strategies during global shocks. The present paper aims to explore the nature of this return connectedness among the asset classes (international equity, Australian equity, property) common among Australian individual investors along with standard safe haven gold during the last two global shocks. As the following literature review will show, this has been previously studied for the GFC and Covid pandemic separately. The present paper will be a significant contribution to literature as it will also compare the observed patterns between the two global shocks and provide additional insights that will be useful for portfolio managers and investment advisers in managing their diversification strategies during similar situations. It is worth noting that the two global shocks under consideration have completely different fundamentals in terms of whether they are economic or psychological in nature. It is also in the Australian context so any insights will be directly useful to investors and financial advisers in Australia.

Literature review

Literature has demonstrated significant increase in return connectedness among markets during GFC but generally no long-term volatility spillovers post GFC (Demiralay & Ulusoy, 2017; Jain & Sehgal, 2019; Kannadhasan & Das, 2019; Liow & Angela, 2017; Nguyen, Balli, Balli, & Syed, 2021). The increased correlation of returns may have limited the extent of diversification benefits during this period (Kannadhasan & Das, 2019). In particular, international diversification may not be as beneficial during this period as country markets became more correlated (Liow & Angela, 2017). When looking at this return connectedness, it is worth noting the difference between contagion and integration. Contagion, as in this case, is a temporary increase of return co-movements while integration involves a gradual long term change (Liow & Angela, 2017).

Increase in return connectedness has also been observed since the Covid outbreak (Bissoondoyal-Bheenick, Do, Hu, & Zhong, 2021; Bouri, Cepni, Gabauer, & Gupta, 2021; Li et al., 2021). This clearly has an impact on investors' portfolios and reduces the benefits of diversification (Bouri et al., 2021).

Literature has also paid attention to the traditional investment safe haven which is gold. One study found that gold provided strong hedging value during the GFC but did not consistently exhibit this property during the Covid pandemic. It appears there was less scope for hedging against losses during this period because the market recovered so quickly from the March 2020 lows (Burdekin & Tao, 2021).

Methodology and data used

Some of the methods used in literature to analyse market co-movements include wavelet analysis (Kannadhasan & Das, 2019), spectral analysis (Liow & Angela, 2017), ADCC-EGARCH (Demiralay & Ulusoy, 2017; Jain & Sehgal, 2019), spillover index (Diebold & Yilmaz, 2009), time varying connectedness index (Bissoondoyal-Bheenick et al., 2021; Bouri et al., 2021; Li et al., 2021) and dynamic conditional correlations (Burdekin & Tao, 2021). The present paper will initially look at simple correlation coefficients between asset classes to identify general trends and will later on explore more involved econometric methods to further examine these trends.

Relevant previous research used various time intervals to calculate returns from price indices. Some used weekly intervals (Demiralay & Ulusoy, 2017; Kannadhasan & Das, 2019; Liow & Angela, 2017), some daily (Bouri et al., 2021; Burdekin & Tao, 2021) and one used quarterly indeces in analysing property prices (Nguyen et al., 2021). The present paper will adopt the common approach of calculating weekly returns from price indices.

There are varying definitions of what constitutes the GFC period: the whole year of 2008 (Kannadhasan & Das, 2019), August 2007 to March 2009 (Demiralay & Ulusoy, 2017), from July 2007 (Liow & Angela, 2017) and 9 August 2007 to 18 October 2009 (Jain & Sehgal, 2019). The present paper will adopt the official period of US recession from December 2007 to June 2009.

Relevant previous research provide different definitions for the start of the Covid pandemic period: early 2020 (Bouri et al., 2021; Li et al., 2021), 22 January 2020 (Bissoondoyal-Bheenick et al., 2021). The present paper will use February 2020 which is when the virus started establishing a foothold in Australia.

The present paper used the following as proxies (all in AUD) for the various asset classes:

International equity – MSCI World ex-Australia

Australian equity – ASX All Ords Index

Property – SP/ASX REIT Index

Gold – Datastream Australia Gold Mining Price Index

Price indices, instead of total return indices, were used as total returns would have a component that are managed (e.g. dividends) and not purely market driven. Weekly price indices from January 1995 to September 2021 were used in the study, providing roughly the same length of period on both sides of the GFC.

Preliminary findings

Pairwise correlation coefficients of returns between the four asset classes identified were calculated for each year from 1995 to 2021. Looking at the table and the accompanying chart, no patterns are clearly discernible even for those periods of interest (i.e. GFC and Covid pandemic) except the general upward trend in correlations representing ongoing market integration. The hedging property of gold is also apparent with its low correlations with the other three asset classes.

Table 1 – Pairwise correlation coefficients between asset classes through the years

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Intl equity vs Aust equity	0.218	0.218	0.380	0.290	0.060	0.129	0.299	0.554	0.463	0.228	0.060	0.306	0.363	0.326	0.457
Intl equity vs Property	0.137	0.082	0.302	0.050	0.079	-0.075	-0.034	0.048	0.430	0.218	-0.007	0.108	0.242	0.299	0.168
Intl equity vs Gold	0.215	0.333	0.191	0.369	0.228	0.010	0.057	-0.491	0.214	0.150	0.164	0.133	0.095	0.074	0.186
Aust equity vs Property	0.556	0.591	0.603	0.582	0.517	0.159	0.185	0.136	0.436	0.582	0.478	0.419	0.727	0.692	0.743
Aust equity vs Gold	0.288	-0.205	0.038	0.095	0.142	0.181	0.061	-0.020	0.087	0.144	0.116	0.192	-0.037	0.084	0.155
Property vs Gold	0.059	-0.193	-0.041	-0.023	0.041	0.008	0.109	0.036	0.117	0.071	0.145	0.155	0.256	0.124	0.085

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Intl equity vs Aust equity	0.438	0.590	0.470	0.436	0.385	0.503	0.549	0.177	0.716	0.543	0.835	0.629
Intl equity vs Property	0.242	0.416	0.159	0.041	0.161	0.577	0.288	0.082	0.209	0.261	0.719	0.449
Intl equity vs Gold	0.209	0.191	-0.033	0.071	-0.044	0.036	0.115	-0.313	0.035	0.183	0.194	-0.074
Aust equity vs Property	0.703	0.715	0.418	0.448	0.652	0.792	0.428	0.481	0.472	0.622	0.895	0.492
Aust equity vs Gold	0.052	-0.129	0.010	0.154	0.102	0.109	0.108	0.150	-0.045	0.019	0.284	0.151
Property vs Gold	-0.223	-0.177	-0.190	0.048	0.265	0.216	-0.035	0.238	-0.193	-0.058	0.345	-0.114

correlation is significant at the 0.01 level   correlation is significant at the 0.05 level

Correlation coefficients through the years
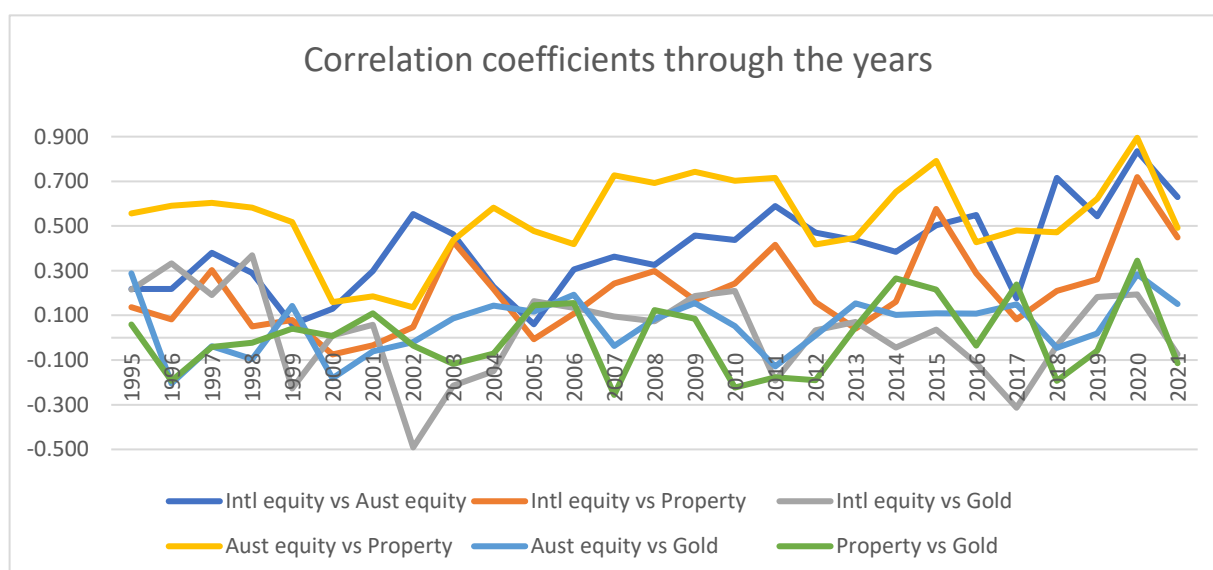
Pairwise correlation coefficients of returns over longer time intervals show more visible patterns.

Table 2 – Pairwise correlation coefficients between asset classes through periods

Period	1. Pre-GFC	2. GFC	3. Post-GFC/Pre-Covid	4. Covid
Intl equity vs Aust equity	0.272	0.371	0.495	0.805
Intl equity vs Property	0.109	0.243	0.269	0.681
Intl equity vs Gold	-0.024	0.094	-0.023	0.146
Aust equity vs Property	0.459	0.705	0.610	0.861
Aust equity vs Gold	0.011	0.084	0.063	0.259
Property vs Gold	-0.031	0.103	0.020	0.287
Annual average returns				
International equity	4%	-21%	11%	12%
Australian equity	10%	-30%	7%	5%
Property	7%	-59%	9%	2%
Gold	19%	4%	8%	-7%

correlation is significant at the 0.01 level   correlation is significant at the 0.05 level

Correlation coefficients through periods
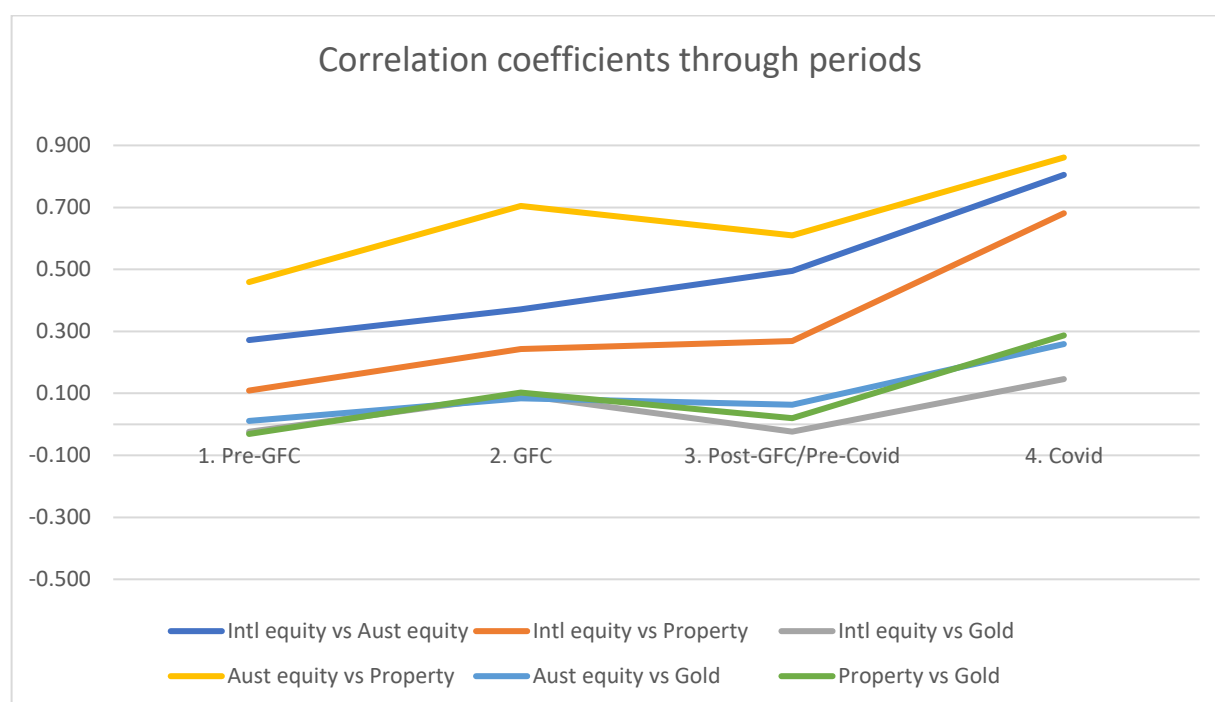
There is a general upward trend in correlations between international equity, Australian equity and property with the effect of the shocks more apparent with Australian equity vs. property. Again, the hedging property of gold is apparent although it is also affected by the shocks. Looking at the returns of the various asset classes, it again highlights portfolio considerations other than diversification.

Conclusion

Consistent with previous literature, there appears to be more co-movements among the various asset classes during periods of global shocks. This seems to be more pronounced in the case of the Covid pandemic. However, it should be noted that this is still technically ongoing so the final picture has not been framed yet.

Additional analysis will be carried out to establish the fundamental nature of the two global shocks. This will hopefully shed light on the differences in asset class return connectedness observed for the two periods.

Other areas that will be refined before this paper is finalised include refining the cut-off dates for the two global shocks and the index proxies used, adding a fixed income asset class in the analysis, analysing reversion to means for both shocks and using more thorough econometric methods of analysis (e.g. GARCH).

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