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Testing for stock return predictability in a large Chinese panel☆

Joakim Westerlund [a,b,*], Paresh Kumar Narayan [b], Xinwei Zheng [c]

[a] Lund University, Sweden
[b] Financial Econometrics Group, Centre for Economics and Financial Econometrics Research, Deakin University, Australia
[c] Deakin University, Australia

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ABSTRACT

This paper proposes a simple panel data test for stock return predictability that is flexible enough to accommodate three key salient features of the data, namely, predictor persistency and endogeneity, and cross-sectional dependence. Using a large panel of Chinese stock market data comprising more than one million observations, we show that most financial and macroeconomic predictors are in fact able to predict returns. We also show how the extent of the predictability varies across industries and firm sizes.

1. Introduction

Consider a panel of returns, $y_{i,t}$, observable for $t = 1,..., T$ time series and $i = 1,..., N$ cross-sectional units, respectively. Recent years have witnessed an immense proliferation of research asking whether $y_{i,t}$ can be

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* Corresponding author at: Department of Economics, Lund University, Box 7082, 220 07 Lund, Sweden. Tel.: +46 46 222 8997; fax: +46 46 222 4613.

E-mail address: joakim.westerlund@nek.lu.se (J. Westerlund)

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predicted using past values of other financial variables such as the book-to-market ratio, the dividend–price ratio, the earnings–price ratio, and various interest rates. The conventional way in which earlier studies have been trying to test the predictability hypothesis is to first run a time series regression of $y_{i,t}$ onto a constant and one lag of the financial variable, $x_{i,t-1}$ say, and then to test whether the so-called predictive slope, β_i, is zero or not by using a conventional t-test (see, for example, Ang & Bekaert, 2007; Polk et al., 2006). This test is then repeated for each unit in the sample, each time using only the sample information for that particular unit.

Hjalmarsson (2010), and Westerlund and Narayan (forthcoming) question this unit-by-unit approach and suggest combining the sample information obtained from the time series dimension with that obtained from the cross-sectional. There are many advantages of doing this. First, in contrast to, for example, cross-country panels where the unit of observation is of some interest, the behavior of individual stocks is relatively uninteresting, which means that little is lost by taking the panel perspective. Second, the use of panel rather than time series data not only increases the total number of observations and their variation, but also reduces the noise coming from the individual time series regressions. This is reflected in the power (against a fixed alternative) of the resulting panel predictability test, which is increasing in both N and T, as opposed to a time series/unit-by-unit approach where power is only increasing in T. Thus, from a power/precision point of view, a joint (panel) approach is always preferred. Third, since power is increasing in both N and T, this means that in panels one can effectively compensate for a relatively small T by having a relatively large N. This is particularly true when considering emerging markets, such as China, where data availability is a critical issue and, whenever data are available, they are usually for a short time span, often insufficient for fitting time series regressions. Fourth, unlike the unit-by-unit approach, the joint panel approach accounts for the multiplicity of the testing problem. It is therefore correctly sized.

However, while appealing in many regards, the panel approaches of Hjalmarsson (2010), and Westerlund and Narayan (forthcoming) also have their fair share of drawbacks. One such drawback is that the allowance for unit-specific intercepts makes the panel test statistics biased. This is quite problematic because, while the bias can be estimated and subtracted off, the resulting statistics are difficult to implement. Moreover, for the bias-corrected tests to be valid it is not enough that N and T are "large", but one also needs $T >> N$, a condition that is typically not met in practice, at least not in emerging markets (as alluded in the above). The tests are also highly dependent on the assumed (near) non-stationarity of $x_{i,t}$, which in practice means that there is a need to pre-test for a unit root.

In this paper we take these drawbacks as our starting point. The purpose is to devise a test that is simple and widely applicable when it comes to the allowable values of N and T. It should also be bias-free, yet robust to the presence of cross-section dependence, and predictor endogeneity and persistency. A test that meets these requirements is proposed under the assumption of a common intercept. The asymptotic distribution of the new test is derived and the implementation of the test is illustrated using an extensive application to China. We focus on the Chinese market for two reasons. First, the majority of time series and cross-sectional studies focus on the US market. The overall impression from this literature is that US stock returns are predictable both in-sample and out-of-sample; for a recent evaluation, see Westerlund and Narayan (2012). Therefore, it is imperative to examine other markets, particularly emerging markets such as China, which has recorded impressive performance over the last decade or so. Second, several studies have shown how the Chinese market is very different from other developed markets such as the US stock markets (see, for example, Narayan and Zheng (2010)).[1] Hence, the US evidence need not be informative of the nature of return predictability in China.[2]

Our sample consists of a large panel of daily observations on 933 stocks spanning the period September 2006 to August 2011. The list of predictors include inflation (INFL), the dividend–price ratio (DP), the dividend–payout ratio (DE), the book-to-market ratio (BM), the three-month Treasury Bill rate (3M), the one-year government bond yield (1Y), and the cross-sectional beta premium (CSP). Our preliminary results suggest that the homogenous intercept assumption is met, suggesting that the new test should be ideally suited for the analysis. The results lead to the conclusion that most predictors are able to predict returns. The only

[1] For other studies on the Chinese market, see Chung et al. (2013), Wang et al. (2015), Li et al. (2013), Guo et al. (2013), Girardin and Joyeux (2013), and Arouri et al. (2015).

[2] There are related studies that examine predictability for other emerging markets; see Narayan, Narayan and Prabheesh (2014), Narayan, Narayan and Thuraisamy (2014) and Bannigidadmath and Narayan (2015) for India; Narayan, Narayan and Prabheesh (2014), Narayan, Narayan and Thuraisamy (2014), Narayan, Sharma and Thuraisamy (2015) for a group of emerging markets.