On the Effects of Prices leading Earnings Phenomenon on Return Models

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Abstract

It is well known that when prices lead earnings, Earnings Response Coefficients (ERC) from Return models (price changes regressed on earnings changes) are biased towards zero (Kothari and Zimmerman, 1995). This paper provides a framework of modeling the effects of the above phenomenon while controlling for the thorny problems of Cross-Sectional Dependence (Bernard, 1987) and cross-sectional variation of the coefficients (defined as Heterogeneity, Teets and Wasley, 1996). Through the use of both heterogeneous and homogeneous panel estimators, which increase the power of the tests, we show that our research framework produces estimates of the ERC that are closer to that implied by the theory than the simple return model. Moreover, we find evidence of cross-sectional dependence and heterogeneity and we provide means of controlling for it. However, our results are far from the plausible values which may be due to the presence of transitory components or non-linearities in earnings and requires further research. Moreover, even though tests of Cross-Sectional Dependence indicate its presence in our data its effects on the results are not visible.

1. Introduction

A very popular subject in the accounting literature examines the relation between securities' prices, and accounting variables. Much of this empirical research employs Price (price regressed on earnings) or Return models (change in price regressed on changes in earnings) to assess the information content of accounting variables on prices. Thus the former are concerned with examining the long term relationship between prices and earnings and the latter are interested in determining the short term effect of earnings on price changes over a specific period of time.

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However, there are cases where the relation between prices and earnings is not a static but a dynamic one and in such instances estimates from a return model are biased. A prime example is when prices lead earnings (Beaver et al., 1980; Kothari, 2001) where the use of a return model will provide biased ERC's towards zero. Kothari and Zimmerman (1995) present evidence by showing that inferences from price models but not from return models are closer to theory in the sense that the ERCs of the price models are closer to the plausible values than those of return model. Even though these results could be due to the presence of transitory components in earnings they additionally show that if this is the case both return and price models will be biased towards zero with identical effects on the ERCs. Hence in this paper we make the assumption that the observed differences between return and price models are due to the price lead earnings phenomenon. This assumption finds empirical support in the results of Beaver et al.(1980, see also Kothari, 2001) and as is shown by Kothari and Zimmerman (1995) when prices lead earnings ERCs obtained from return models are biased towards zero.

Prior evidence has also identified, but has not sufficiently dealt with two thorny problems that arise in cases of large panels of firms are cross-sectional dependence and heterogeneity. Bernard (1987) conducted one of the first studies on the effects of cross-sectional dependence (CSD hereafter) on the inference based on models that has returns as the dependent variable. He concluded that unless we do not control for CSD the standard errors of the estimates will be downwardly biased and thus inferences cannot be made on the significance of the coefficients since the associated t-statistics will be inflated. Kothari and Zimmerman (1995) also identify this issue as one of the limitations of their study. In the context of the present paper we apply techniques that control for CSD, using the CD test of Pesaran (2004) and provide evidence on cross-sectional dependence. However, our results fail to observe the anticipated effects of CSD on the standard errors (a downward bias) of the coefficients that are estimated under various specifications. This result can be a problem of either the test used to examine the null of no CSD or of the method used to alleviate the problem and requires further research.

Concerning the issue of Heterogeneity one of the first studies on the field is the one by Wasley and Teets (1996) who show that the use of pool estimation may lead to incorrect inferences about the magnitude of estimated coefficients. Specifically for return models Kothari and Zimmerman (1995) also recognize that the ERCs may vary cross-sectionally. Evidence provided in this paper confirms the above argument and show that heterogeneity may insert considerable bias in ERCs estimated using large panels of firms.

The focus of this paper is to provide a framework of obtaining unbiased ERCs from return models when prices lead earnings. It adds to the existing literature by proposing a model that can overcome the aforementioned problem and thus provide estimates that are closer to that implied by the theory. Moreover, the proposed model is theoretically supported by panel cointegration techniques and estimators that can alleviate the problems of CSD and heterogeneity since in their presence the results of simple pooled OLS can be vastly misleading. Moreover, it provides additional evidence on the problems in inference caused by CSD and heterogeneity.

The remainder of this paper is organized as follows: Section 2 presents the model. Section 3 describes the variables and presents descriptive statistics. It also analyses the preliminary results on Integration and Cointegration of the variables. Section 4 presents the main empirical results and last, Section 5 summarizes the paper and offers implications for further research.

2. The model

The development of the model begins with some theoretical assumptions for its theoretical support. First it is assumed that the market is at least weak efficient (Chan et al., 1997) and current earnings contain information about expected future net cash flows (Dechow, 1994). Furthermore, price is the discounted value of expected cash flows (Modigliani and Miller, 1969). Last, prices[1] and earnings follow a random walk. In algebraic form the model is as follows:

$$P_{i,t} = \alpha_i + \beta_i EPS_{i,t} + \varepsilon_{i,t} \tag{1}$$

With

$$EPS_{i,t} = EPS_{i,t-1} + u_{i,t} \tag{2}$$

And

$$P_{i,t} = P_{i,t-1} + \theta_{i,t} \tag{3}$$

where $\varepsilon_{i,t}, \upsilon_{i,t}\ and\ \vartheta_{i,t}$ are normally distributed error-terms with zero expected mean, constant variance and not-autocorelated. $EPS_{i,t}$ is the earnings per share of company *i* at time *t* and $P_{i,t}$ is the price of company *i* at time *t*.

Since the seminal work of Ball and Brown (1968), the above model is a benchmark in the value relevance studies. The slope coefficient *β* is called the Earnings Response Coefficient (ERC) and is expected to be *1/r* or close to *1/r*, where *r* is the discount rate for future earnings. However, the estimation of the price model is complicated by the presence of unit roots in prices and earnings which may lead to spurious regression. On the other hand the

[1] Which is in line with the EMH and has been tested on several empirical grounds.

return model suffers less from econometric problems but its results are not close to the plausible. In formal terms the return model is[2]:

$$\Delta P_{i,t} = \alpha_i + \beta_i \Delta EPS_{i,t} + \varepsilon_{i,t} \tag{4}$$

Especially when price-leads-earnings the return model produces biased results. The reason is that even though earnings time series properties are approximated by a random walk market seems to anticipate a fraction of the change in earnings. In algebraic terms:

$$EPS_{i,t} = EPS_{i,t-1} + SUR_{i,t} + sc_{i,t-1} \tag{5}$$

where $SUR_{i,t}$ is the component of the surprise in earnings that the market does not expect and $sc_{i,t}$ is the stale component of earnings that has zero mean constant variance and is serially uncorrelated and has been anticipated the previous year. The above specification of earnings is proposed by Kothari (1992) who argues that since price reflects a portion of earnings this fraction of earnings is anticipated in earlier periods. As in Kothari and Zimmerman (1995) we assume that the market anticipates only one period ahead.

What is implied from the above analysis is that when prices lead earnings price at time t, P_t will not be equal to the discounted earnings, $(1/r)EPS_t$ but it will exceed them if market expects positive earnings changes or vice versa. The difference between the two will be equal to $sc_{i,t}$. Now in time $t+1$ a part of the earnings surprise ($sc_{i,t}$) is stale since it has been forecasted in time t and thus a regression of price changes on earnings changes will lead to biased ERC towards zero. The reason is that the stale component in earnings cannot explain the change in price and thus the independent variable measures the variables of interest with error (errors-in-variables problem). Thus what we need is to isolate the effects of the surprise component $SUR_{i,t}$ on the price changes. By solving for $SUR_{i,t}$ in Eq. (5) and substituting in Eq. (6) we get:

$$\Delta P_{i,t} = \alpha_i + \beta_i \Delta EPS_{i,t} + \gamma_{i,t} sc_{i,t-1} + \varepsilon_{i,t} \tag{6}$$

Where slope coefficient $\gamma_{i,t}$ is expected to be negative. The problem that emerges now is how we can estimate the stale component of earnings $sc_{i,t-1}$. As has been discussed above $sc_{i,t-1}$ is

[2] It should be noted that in contrast with Kothari and Zimmerman (1995) when we refer to the return model we mean the specification that they call differenced-price specification.

the difference between price and discounted earnings for the previous period which can be seen as the residuals of a regression of price on earnings per share. However as also discussed above price and earnings per share follow a random walk and thus a regression that involves them can lead to spurious results. However, if the two variables are cointegrated then a linear transformation of them (the residuals) is stationary and its inclusion in Eq. (6) will not lead to spurious regression. Concerning the cointegration of prices and discounted earnings per share it is expected that the two variables are bound to move together since they are proxies for the future cash flows of the firm. However, in the short run the presence of the stale component of earnings will lead earnings to deviate from their relationship. In the long run their relationship is expected to converge back to their relationship since the stale component has a zero mean.

What remains now is to find an estimator that can overcome the problems of heterogeneity and cross-sectional dependence. A possible solution in the presence of cross-sectional dependency, among others in the literature, is Zellner's SUR methodology (1962). It refers to employing a seemingly unrelated regression approach. Nevertheless, in our case where N is large, this would require the inversion of prohibitively high-dimensional matrices and thus the estimation is infeasible (Smith et al., 2004). A second remedy, which is the one we propose, is the Common Correlated Estimator (CCE) of Pesaran (2006) In this vein the above equation is estimated using both homogeneous and heterogeneous estimators in a pooled framework. First, to examine if the heterogeneity assumption is plausible we start by examining a pooled version of Eq. (4) where the ERC is assumed homogeneous (defined as the Pooled Homogeneous Return model-PH Return model). The reason is to obtain an ERC that will be the benchmark on which we will base our discussion of results. Then we estimate a homogeneous version of the CC estimator for the model of Eq. (4) that is we allow for cross-sectional dependence (defined as the Homogeneous CC Return model-HCC Return model). This leads to the following model:

$$\Delta P_{i,t} = \alpha_i + \beta_i \Delta EPS_{i,t} + \delta\mu_{1,t} + \delta\mu_{2,t} + \varepsilon_{i,t} \tag{7}$$

Where $\mu_{1,t}$, is the sum of the cross-sectional means and the lags of cross-section means of the change in price and $\mu_{2,t}$, is the sum of the cross-sectional means and the lags of the change in earnings. This approach has been proposed by Pesaran (2006) and he shows that the sum of the lags of the cross-sectional means can soak up the CSD arising in panels with a large number of firms. The number of lags used is estimated using the Hendry (1986) General-to-Specific approach. Moreover, he also proposes the use of the Mean Group (MG) estimator when the slope coefficients are assumed to be heterogeneous. From the above the first research hypothesis is that the standard errors of the slope coefficients using the CCE will be larger than the one obtained without it due to downward bias caused by CSD. The next step is the homogeneous CC-Error Correction Model (HCC-ECM) based on Eq. (6) where we expect that the ERC will be larger than that of the two former cases due to controlling for the effects of the stale component of earnings. In algebraic terms the proposed model is as follows:

$$\Delta P_{i,t} = \alpha_i + \beta_i \Delta EPS_{i,t} + \gamma_{i,t} sc_{i,t-1} + \delta\mu_{1,t} + \delta\mu_{2,t} + \varepsilon_{i,t} \qquad (8)$$

Last using the MG estimator we expect that the ERCs will be larger for each specification due to relaxing the Homogeneity assumption.

After examining the properties of the return model under the assumption of Homogeneity we move to the two estimators that allow for Heterogeneity namely the Return model estimated using the CCEMG estimator of Pesaran (2006) (denoted CCEMG Return model) and an ECM that is also based on the same estimator.

3. Sample Description Preliminary Results of tests for Cross-Sectional Dependence Integration and Cointegration

3.1 Sample Description

Our primary sample consists of all the active and inactive US firms for the period 1950-2005 employing data from the merged Compustat and CRSP annual database. As in Kothari and Zimmerman (1995) we include firms with at least two annual earnings per share, and prices observations. To avoid undue influence of extreme observations, we also exclude 1% of the observations with the largest and smallest values of earnings per share, accruals, cash flows, and sales. The final sample consists of 160103 observations on 8920 firms. All firm-year observations with SIC codes in the range 6000–6999 (financial companies) are also eliminated because of the different way of reporting of these firms. We use per share values, adjusted for changes in share capital and splits etc. The variable definitions are: EPS is earnings per share before extraordinary items and discontinued Operations (Compustat #18) divided by the number of shares outstanding (Compustat #24). P is fiscal year end size-adjusted prices, inclusive of dividends and other distributions (Compustat #199). Table 1 presents the summary statistics for the relevant variables. As it can be seen the average price-to-earnings ratio is 13.4 which is marginally larger than the one reported by Kothari and

Zimmerman (1995) which is around 12. Moreover, both earnings and prices are skewed and dispersed.

3.2 Preliminary Results of tests for Cross-Sectional Dependence Integration and Cointegration

A necessary first step before proceeding to estimation of the models is to test the assumption of Cross-Sectional Dependence. Indeed results of the CD-test of Pesaran (2004)[3] show that residuals from regressions of either prices on earnings per share or change in prices on change in earnings per share are cross-sectionally dependent with a value of 123.99.

We now turn to the estimation of the ECM. Following Engle and Granger (1987) there are two steps involved in using the cointegration modeling framework. First it is necessary to test the variables for their level of integration, that is, whether the individual variables contain unit roots. Second if the variables are found to contain unit roots we proceed to the second part and test for the existence of a long run relationship. Concerning the integration of the variables we use the tests of Pesaran (2006) and the Hadri and Larsson test (2005). Both test control for cross-sectional dependence[4] and are able to deal with heterogeneity and small samples (for a thorough review see Breitung and Pesaran, 2005). Nevertheless, while the first has as null that the variable under examination is not stationary the second examines the null of stationarity. This cross-test is done to be more confident in the inferences about the integration of the variables. The results of the tests are shown in table 2 and as it can be seen the assumption of a random walk in both earnings and prices cannot be rejected.

Next we continue to the next step of examining whether prices and earnings are cointegrated. The test used is the McCoskey and Kao (1998) test for the null of cointegration with bootstrapped based critical values to control for CSD. Apart from CSD the test is able to confront with heterogeneity. The critical values are computed using the Westerlund (2006) algorithm. The results are tabulated in table 3 and it can be seen that the null of cointegration of prices and earnings cannot be rejected.

[3] The test is asymptotically distributed as N(0,1) and has as null hypothesis zero dependence between the residuals of the cross-sections. Also some preliminary results on poolability of the data using the Baltagi et al., (1996) test rejects the null hypothesis of homogeneity. Results will be available in a future version of the paper.

[4] While the former uses the CC Estimator as a remedy for CSD the later does not control for it. Thus we compute bootstrapped critical values using the algorithm presented in Madalla and Wu, (1999).

4. Results

4.1 Estimation and inference under the assumption of Homogeneity

We start by examining Eq. (4) using pooled OLS as in Kothari and Zimmerman (1995) in order to obtain benchmark estimates on which we will base our discussion of the main results. This consists of our initial attempt to model the price-earnings relationship and two caveats are offered: first we do not replicate their study and the reason for not using the results of Kothari and Zimmerman is the differences in the time series length of the samples. This will cause the ERC to be different for OLS estimation due to the fact that our sample comprises relatively large surviving firms and previous research indicates that the expected rate of return differs according to the size of the firm (Banz, 1981). Second in the presence of CSD the standard errors of the estimated coefficients will be biased towards zero. Nevertheless, the OLS estimator is super-consistent for its true value and only the t-statistic diverges (Kao, 1999). Panel A of Table 3 shows the results of pooled OLS assuming homogeneity of the firms. The slope coefficient ranges is 1.72, which is near the value reported in Kothari and Zimmerman (1995) which is 2.09. Moreover, the standard error is 0.058 and the adjusted R^2 is 0.07. Both values are near those reported by Kothari and Zimmerman and indicate that changes in earnings cannot explain much of the variation in change in prices. Moreover, we cannot assess the significance of these estimates due to the possible downward bias of the standard errors due to CSD. Next we enhance the model of Eq. (4) with the cross-sectional means of change in earnings and prices that is we estimate the Return model using the CC Estimator of Pesaran (2006). The reason is to examine the first research hypothesis that standard errors of the Poolled Homogeneous Return model will be smaller than those from the Homogeneous CCE Return model due to the presence of CSD. The results are tabulated in Panel B of Table 4 and show that the standard errors of the Homogeneous CCE Return model are marginally larger than those of the simple Pooled Homogeneous Return model. This might be due to the fact that the Pesaran estimators are designed to soak up cross-sectional dependence due to only one common factor[5]. However, there is a large difference in the explanatory power which is increased to 17% and this could be attributed to the modeling of the effects of the common factor. Moreover, as it can be seen only the common factor in Prices is significant and the value of near unity is in agreement with its plausible value (Pesaran, 2006). Its interpretation might be that it acts as a proxy for the market index and potentially captures omitted variables. Last we estimate the Error Correction Model of Eq. (6) to examine if the proposed modification of the Return model is able to capture the effects of

[5] Nevertheless, examination using other approaches that model the effects of more than one common factors such as the one of Bai and Ng (2005) is left for further research.

the stale component and thus produce an ERC that is closer to its plausible value. The results are shown in Panel B of Table 3. As it can be seen the ERC is 2.32 which means that it is nearly twice in magnitude as the ERC from the simple Return model. Moreover, among the homogeneous alternatives that were as far estimated the ECM produces the best fit with an adjusted R^2 of 0.19.

Panel A of Table 5 show the results of the estimation of the Homogeneous CC Error Correction Model. Consistent with our assumptions the ERC is considerably larger than that of the previous two models indicating that their estimated ERCs maybe downwardly biased due to the prices-lead-earnings phenomenon. However, it is marginally smaller than that obtained from the ECM without the CC estimator. This may be due the presence of the cross-sectional mean of prices that absorbed some of the explanatory power of earnings. Moreover, the adjusted R^2 of the Homogeneous CC Error Correction Model is 0.27 and considerably larger than those of the other three models indicating the better fit among the class of the Homogeneous estimators presented in this paper. Again the term representing the common factor in earnings is insignificant while the term representing the common factor in prices is again near unity.

In conclusion even though the proposed ECM specification produces the best results in terms of plausibility of the ERC it is still far from its plausible value of 10-12. Thus we proceed to the estimation of the models after relaxing the assumption of Homogeneity of the ERCs.

4.2 Estimation and inference under the assumption of Heterogeneity

Panels B of Tables 4 and 5 present the results of the Heterogeneous CC Return and ECM models respectively. The first important result is that in contrast with the CSD case where there was no observable effects[6] the effects of Heterogeneity are obvious. Using the simple CC Mean Group estimator for the Return model, results to an ERC of 4.56 and an adjusted R^2 of 0.37. This implies that the Homogeneity assumption is a rather strict assumption when investigating the price earnings relationship and the cross-sectional variation of the ERC should be taken into consideration. Moreover, the results of the CCMG-ECM are even better in terms of goodness of fit with an adjusted R^2 of 0.50. Concerning the ERC it is near the one obtained from the simple Heterogeneous CC Return model. A thing worth noting is that in all ACM specifications the slope coefficient of the stale component is between its plausible values which are -1 and 0 and it ranges from -0.11 to -0.25. This means that the magnitude of the stale component of earnings is rather big and thus a smaller coefficient is needed in order

[6] The results where obtained using the only the method of Pesaran (2006). Thus they are only indicative and further research is needed in order to generalize them.

to converge to equilibrium. Further evidence providing support to the above intuition is the finding of a very small ERC when using the traditional Return model.

To conclude it seems that the use of the Heterogeneous Estimators (Mean Group estimators of Pesaran et al., 1999) provides better ERCs in terms of plausibility of their magnitude and a better fit in terms of the adjusted R^2.

6. Conclusion and Implications for Future Research

Despite the intensive econometric testing over the last decades the results of the return model are mixed and the relation between the change in prices and change in earnings per share is unstable with low ERCs and R^2. In this paper we argue that this is expected when prices-lead-earnings since in this case the ERCs obtained from Return models are biased towards zero. This is caused by the presence of a stale component in earnings that is anticipated the previous period and thus is price irrelevant and introduces an error-in-variables bias.

Thus the aim of this study is to provide a model that controls for this value irrelevant component of earnings and this is attempted using an ECM formulation. Moreover, our tests are designed to take into consideration two thorny problems that have been found to complicate inference in panels with a large number of firms Heterogeneity and Cross-Section Dependence.

The results show a number of points. First even though the assumption of cross-sectional dependency is supported by our data when it comes to the estimation of the models we find no severe distortions to the standard errors. As discussed above this could be due to the fact that the method used is able to capture cross-sectional dependencies due to only one factor. Second, Prices and Earnings per share are integrated of order one that is the assumption of a random walk cannot be rejected for both of them, and cointegrated. This enables us to continue by estimating our proposed model using the technique of panel cointegration. The results show that controlling for the stale component of earnings produces better results but they are still far from the plausible value of 10-12.

Our findings have implications for capital markets research in accounting. The results indicate that unless heterogeneity between the members of the panel is taken into consideration the results will be seriously biased. Moreover, modeling the effect of the stale component in earnings may be produce fruitful results. An issue that requires further research is the effect of Cross-Sectional Dependence using a method that assumes that the CSD is produces by more than one factor. More interestingly however, would be to incorporate in our model the effects of non-linearities and transitory items in earnings which are another two sources of downward bias in the ERC but this is left for future research.

Table 1: Descriptive statistics for price and earnings per share per share for the period 1950-2004.

Variable	Mean	Median	Std. dev.	Min.	Max.
$P_{i,t}$	19.17	15.00	16.19	0.06	88.00
$EPS_{i,t}$	1.43	1.13	2.21	-30.97	211.47

Notes: The sample includes any firm that has at least 2 consecutive observations. $P_{i,t}$ is the price inclusive of dividends and $EPS_{i,t}$ is the earnings per share per share excluding the extraordinary items and discontinued operations. The final sample consists of 8920 firms excluding firms of the financial sector and firms with missing observations.

Table 2: Results of tests for Integration and Cointegration of Prices and Earnings

Panel A: Tests for Integration

Variable	Pesaran panel unit root tests		Hadri and Larsson Unit Root test	
	CIPS	TCIPS	Z-stat	*B. Critical Value*
$P_{i,t}$	-1.73	-1.72	84.35***	47.68
$EPS_{i,t}$	-1.79	-1.79	153.45***	68.64

Panel B: Tests for Cointegration

	Standardized McCoskey and Kao LM test	Bootstrapped Critical values of the LM test		
Level of Signifficance		1%	5%	10%
LM Test- stat	1.43	6.19	5.16	4.84

Notes: *,** and *** denotes significance at the 10%, 5% and 1% level. Critical values for the CIPS and TCIPS test are provided in Pesaran (2005). The choice of the lag length was based on the Hendry (1986) General-to-Specific approach. The panel unit root tests are adjusted for serially correlated errors. The Bootstrap versions of Maddala and Wu and Choi tests were computed using 1000 Bootstrap samples. The Bootstrap algorithm is provided in Maddala and Wu, 1999. The critical values of standardized LM-test are the 1%, 5% and 10% critical values of the right tail of the normal distribution. The choice of the number of leads and lags was based on the Hendry, (1994) General-to-Specific approach. The Bootstrap version of the LM-test was computed using 1000 Bootstrap samples. The Bootstrap algorithm is provided in Westerlund (2006).

Table 3: Estimation results of the return model using homogeneous estimators under the assumption of Cross-Sectional Independence.

Panel A: OLS estimation

Variable	α_i	t-stat	β_i	t-stat	Adj. R^2
	0.25	17.70***(0.023)	1.72	23.33***(0.058)	0.07

Panel B: ECM Estimation

Variable	α_i	t-stat	λ_i	t-stat	γ_i	t-stat	Adj. R^2
	0.19	7.65	2.32	35.35	-0.25	-80.57	0.19

Notes: *,** and *** denotes significance at the 10%, 5% and 1% level. Standard Errors are in parentheses.

Table 4: Estimation results of the return using the CCE Estimator.

Panel A: CC OLS estimation based on homogeneous estimator

Variable	α_i	t-stat	β_i	t-stat	$\mu_{i,1}$	t-stat	Adj. R^2
	0.31	22.85(0.022)	1.73	23.76(0.059)	1.04	102.13	0.18

Panel B: CC OLS estimation based on heterogeneous estimator

Variable	α_i	t-stat	β_i	t-stat	$\mu_{i,1}$	t-stat	Adj. R^2
	0.13	-0.04(1.61)	4.56	2.28(2.71)	1.11	1.95	0.37

Notes: *,** and *** denotes significance at the 10%, 5% and 1% level.

Table5: Estimation results of CCEMG-ECM.

Variable	α_i	t-stat	λ_i	t-stat	γ_i	t-stat	$\mu_{i,1}$	t-stat	Adj. R^2
Panel A: Estimation based on the homogeneous CCE estimator									
	0.25	10.91	2.02	3.34***	-0.21	-70.34***	0.91	99.02***	0.26
Panel B: Estimation based on the heterogeneous CCE estimator									
	0.23	0.17	4.39	2.45	-0.11	-2.29	1.04	2.01	0.50

Notes: *,** and *** denotes significance at the 10%, 5% and 1% level. The choice of the lag length was based on the Hendry (1986) General-to-Specific approach.

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