行政院國家科學委員會專題研究計畫成果報告

股票價格對於會計盈餘永久性及暫時性衝擊的反應

The Response of Stock Prices to Permanent and Temporary Shocks to Accounting Earnings

計畫編號：NSC 88-2416-H-002-010
執行期限：87 **年** 8 **月** 1 **日至** 88 **年** 7 **月** 31 **日**
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一、中文摘要

本研究的目的在於以股票價格的變動及股價盈餘差數（price-earnings spread**，本益比的自然對數值）來研究股價對盈餘衝擊**(earnings shock)**的反應。**

首先假設盈餘的隨機過程(stochastic process)**為一永久性部份**(permanent component)**與暫時性部份**(transitory component)**的總和，和許多文獻不同的是：永久性部份不一定需假設為隨機漫步**(random walk)**，此係一過於強烈的假設。利用如** Modigliani & Miller(1961) **及** Miller & Rock (1985) **的股票評價模型可以將一公司之盈餘與股價連結在一起。由於本研究假設永久性盈餘不一定是隨機漫步，在分解為永久性及暫時性部分時會有認定**(identification)**的問題，前述的理論關係可以幫助我們在為股價變動及股價盈餘差數設立二元時間序列模型時做認定。納入股價盈餘差數的理由在於股價及盈餘之間可能有共積的現象，因此可採用類似** Engle and Granger (1987) **中提及的誤差修正模型** (error correction model, ECM) **方法。本研究利用二元的移動平均模型** (bivariate moving average model, BMAR)**及二元自我相關模型** (bivariate auto-regressive model, BVAR) **配合著前述的理論關係將股價及盈餘的衝擊分解為永久性及暫時性的部份，透過變異數分解** (variance decomposition) **及脈衝反應分析** (impulse response analysis) **進一步瞭解股票價格及其變動與本益比對永久性及暫時性的盈餘衝擊的動態反應，有助於我們了解股價變動的影響因素及影響方式。本研究的結果指出投資人並無法區分盈餘中的永久性及暫時性部份，這可以解釋股票平均數復歸** (mean-reverting) **現象造成的可能原因為股票報酬率中有很大一部份的性質為暫時的。股價盈餘差數的變動主要源於盈餘暫時性的衝擊，這也顯示股價相對於盈餘在盈餘有暫時性的衝擊時會有較劇烈的反應。**

關鍵詞：永久性盈餘、暫時性盈餘、股票價格、二元時間序列模型

Abstract

The purpose of this research project is to use stock return and price-earnings spread to study the impacts of earnings shocks on stock prices.

We first assume that the stochastic process of earnings and stock price consist of a permanent and a transitory components. What distinguishes this project from most accounting and finance research is that the permanent part of stock price or earnings need not be random walk, which is unduly strong for the sake of specifying a return generating process. The stock valuation model in

Modigliani & Miller (1961) and Miller & Rock (1985) help to link a company's earnings and stock price. Since we do not assume that the permanent part of earnings is random walk, there will be an identification problem with building a bivariate time series model, which can be handled by invoking the above-mentioned theoretical relation. We then proceed by estimating both the bivariate moving average and the autoregressive models via the theoretical relation. Through variance decomposition and impulse response analysis, we are able to see how stock return and price-earnings spread dynamically respond to the permanent and temporary shocks to accounting earnings, which tells us how stock returns are determined. The results of the analysis show that investors fail to distinguish between the permanent and transitory parts of earnings unmistakably. The mean-reverting behavior of stock returns can also be explained by the existence of a significant temporary component in the stock returns. The price-earnings spreads are mostly explained by the temporary shocks to earnings. This means that, induced by the temporary component of earnings, stock prices respond excessively to earnings.

Keywords: permanent earnings, transitory earnings, stock prices, bivariate time series model

二、緣由與目的

盈餘與股價間的關係無疑是會計學與財務學中最重要的研究課題。財務會計主要的目的即是對目前及潛在 (potential) 投資者、債權人及其他資訊使用者，提供從事理性之投資、融資等類似決策，所須之有用資訊，進而促進有限資源之適當分配；而其中又以股票投資人對公司之獲利能力最為關切。如果盈餘與股價兩者之間的關係不存在，財務會計的功能將大打折扣。盈餘可以說是財務報表中最重要的項目，也是所謂的"bottom line"。財經報導中盈餘應是最常被報導及引用的數據之一。在一個公司的經營期間裡，所有可創造或減損價值的事件最後均會反應在盈餘裡，股東權益裡所有的「加值」(value added) 都會顯現於盈餘，會計盈餘與股票報酬間將有一定的關係，此關係有可能是同期的、領先的或落後的。在一個企業結束營運時，它的市場價值將等於帳面價值，意味著累積的股票報酬大致會等於累積的會計報酬。因此，在長期 (long-run) 而言，盈餘、股利及股東報酬間有一基本的關係，而這個關係是學術界及實務界一直關心的問題。

盈餘與股價關係的研究最早可追溯自 Benston (1966)及 Ball and Brown (1968)。他們看的是股價變動及會計盈餘變動之間的關係。Ball and Brown 發現股價改變的符號及盈餘改變的符號間有明顯的關聯。Beaver, Clark, and Wright (1979)延伸了 Ball and Brown 的作法，也考慮盈餘變動幅度的大小，他們根據價格剩餘變動率 (residual percentage changes in price) 將樣本分為 25 個投資組合，發現盈餘剩餘變動率 (residual percentage changes in earnings) 與價格剩餘變動率有顯著的正向關係。由價格的變動來看，似乎顯示投資人現在的盈餘與公司以後的盈餘及未來支付股利的能力有統計上相依的關係。由價格的變動來看，也隱含目前盈餘的改變有一部份屬永久性。盈餘當中一部份的改變與預期支付能力水準的永久性變動有關。不過，股價的改變與盈餘的改變並非一一對應的：對極端的投資組合而言，股價變動率常小於盈餘變動率。此現象指出盈餘中應有一部份屬於暫時性質的。這些暫時性的部分會影響當期的盈餘，卻不會影響預期未來的盈餘。Kothari and Sloan (1992) 發現前期的盈餘 (lagged earnings) 亦有解釋能力。Beaver, Lambert, and Morse (1981) 假設 ungarbled earnings 為一一階累加移動平均過程 (first-order integrated moving average process)，此時價格變動與盈餘變動迴歸係數與移動平均過程係數之間有一定的關係。Easton, Harris, and Ohlson (1992) 將盈餘與股價變動衡量的期間拉長，發現隨著窗期的增加，兩者的關係亦增加。上述的研究一般人稱為「盈餘資訊內涵研究」(information content of earnings' research)。

Beaver, Lambert, and Morse (1981) 及 Beaver, Lambert, and Ryan (1987) 探討「價格資訊內涵」(information content of prices)問題，基本上是將前述研究的自變數與應變數互調，即所謂的反迴歸(reverse regression)。價格可以協助我們解釋現在的盈餘及預測未來的盈餘，股價之所以會領先盈餘是因為歷史成本的性質及應計會計制度，會計對資產及負債經濟價值改變的承認多有落後的現象，然而股價的反應卻是立即的。

Beaver, NcAnally, and Stinson (1997)進一步指出可以利用聯立方程式的方法估計股價變動與盈餘變動之間的關係，而此關係是屬於內生(endogeneous)性質的, 由單一方程式估計所產生的誤差可藉著聯合估計消除。

Beaver and Morse (1978) 發現在年底時高本益比的股票在當年度中多半有較低的盈餘成長，而爾後各年的盈餘成長則較高，同樣的低本益比的股票在當年度中多半有較高的盈餘成長，而爾後各年的盈餘成長則較低。如果投資人認為盈餘中存在著暫時性的部分且盈餘確實有暫時性的部分，以上所述的現象是可以預期的。

Kormendi and Lipe (1987) 研究未預期的盈餘對股票報酬率的影響程度與預期未來盈餘變動修正的現值有關，他們以單元的時間序列模型來描述盈餘的改變。其貢獻主要在於探討時間序列性質假設對股票評價方程式的涵義，並指出股票報酬率對未預期盈餘（暫時性部分）的反應並非過於激烈，此研究與 Campbell and Shiller (1987) 的作法有些關係，唯本研究將盈餘與股價兩序列均取一階差分的作法忽略了兩變數間可能存在的共積的問題。

Lipe (1990) 以 Kormendi and Lipe (1987) 為基礎，假設市場上有除了盈餘以外的第二種資訊，仍然探討股票報酬率與會計盈餘間的關係。他發現股票報酬率是盈餘時間序列持續性、用來折現預期未來盈餘之利率以及盈餘相對於其他資訊預測未來盈餘能力的函數。

在另一方面，雖然以 Fama(1970) 為主早期的財務文獻中皆發現股票價格可以以隨機漫步(random walk)描述，不過最近十餘年年的研究不少指出股票報酬率是可預測的（如 Keim and Stambaugh, 1986; Fama and French, 1988, 及 Lo and Mackinlay, 1988），表示股價中含有一暫時性的部分，因而可以利用過去的報酬率預測未來的報酬率。Fama and French (1988) 把股價的對數值表示為一隨機漫步（永久性）部分與一階自我相關（暫時性）部分的總和。Wang (1989)亦指出未獲訊息投資人的存在會使股價產生超額的波動(excess volatility)，原因在於他們把股利的暫時性部分的改變當成是永久性部分的改變。這些研究指出把股價和股利拆開來為永久性及暫時性的部分可以幫助我們了解股價的行為。根據會計及財務的文獻可知股價、股利及盈餘數列皆似乎為非恒定隨機過程(nonstationary process)，例如 Ball and Watts (1972), Albrecht, Lookabill, and Mckeown (1977), Watts and Leftwich (1977), Kleidon (1986), Marsh and Merton (1986, 1987), Campbell and Shiller (1987), Lee and Wang (1994), 及 Lee (1995)，顯示這些數列可能不只受一種干擾項(disturbance)的影響，因此我們可以把股價、盈餘等數列拆為永久性及暫時性的部分。

在國外的文獻中，以二元時間序列將把盈餘與股價數列拆為永久性及暫時性的部分並考慮共積問題的文章應

尚未出現，Lee (1995)考慮的是股利及股價序列，Lee(1996) 考慮的則是股利及盈餘序列。主要的困難點仍在於會計盈餘與股價之間的理論關係並不十分清楚。

至於國內的文獻，研究異常盈餘與異常報酬率較早的如余尚武（民 75），結果並未發現盈餘宣告有資訊內涵。李華玉（民 81）利用前述之反迴歸發現以股價為基礎的盈餘預測模型的預測能力優於傳統的隨機漫步模型。林永松（民 82）採用 Easton, Harris and Ohlson (1992)的作法發現盈餘對股票報酬的解釋能力會隨著變數衡量期間的拉長而增加，在某些期間盈餘變動與盈餘水準對股票報酬均有解釋能力，但無法判定何者的解釋能力較大。Chu (1991)發現會計盈餘具資訊內涵且盈餘的組成份子具增額資訊內涵，投資人對營業外所得的反應較國外為強，徐淑卿（民 82）亦有相同的發現。王月玲（民 83）發現大公司的盈餘反應係數大於小公司的盈餘反應係數，支持盈餘品質假說。朱立倫（民 86）發現盈餘與股票報酬的關係與市場的多空呈負向的關係。以上所列舉僅是國內從事盈餘與報酬率文獻中的一小部份而已，唯國內似尚未有以本研究所欲嘗試的方法完成的研究。

本研究的目的在於以股票價格的變動及股價盈餘差數（本益比的對數值）來研究股價對盈餘永久性及暫時性衝擊的反應。首先假設股價及盈餘的隨機過程為一永久性部份與暫時性部份的總和。利用二元的移動平均模型配合著前述的理論關係可將股價及盈餘的衝擊分解為永久性及暫時性的部份，透過變異數分解及脈衝反應分析可進一步了解股票價格及其變動與本益比對永久性及暫時性的盈餘衝擊的動態反應，有助於我們了解股價變動的影響因素及影響方式。本研究的結果可用來解釋平均數復歸現象造成的原因；此外，市場效率性的高低與股價所反應的主要是永久性盈餘的衝擊還是暫時性盈餘的衝擊有關，本研究的結果亦可針對此點提出新的看法與證據。

三 結果與討論

本研究利用二元時間序列模型(bivariate time series model)探討把股價及盈餘分解為永久性及暫時性部分的問題，然後再試圖了解盈餘永久性及暫時性的部分之衝擊(shocks)如何影響股價及本益比，精神與 Blanchard and Quah (1989)、Quah (1991) 及 Lee (1995, 1996)相似，與大部分文獻不同的是盈餘永久性的部分不一定要假設為隨機漫步(random walk)而且永久性及暫時性的部分之衝擊(shocks)在統計上並不一定非獨立不可。Kormendi and Lipe (1987)試圖把股價及盈餘連結在一起，他們也是把股價及盈餘分解為永久性及暫時性兩個部分，並將股價的兩個部分與盈餘的兩個部分串起來。本研究與 Kormendi and Lipe (1987)不同處在於他們使用的是差分後的序列(differenced series)，並未考慮共積(cointegration)的問題，其模型有定式的問題(misspecification)；本研究則係利用 Campbell and Shiller (1987)及 Lee (1995)的作法使用二元自我相關及移動平均模式，所考慮的變數是股價的一階差分及股價盈餘差數(stock price-earnings spread)，並非 Kormendi and Lipe (1987)所使用的差分後序列。前述的股價盈餘差數係由對數股價減對數盈餘的某一倍數而得，而此一倍數則與共積向量(cointegration vector)有關。在理論上，利用 Modigliani & Miller (1961) 及 Miller & Rock (1985) 的股票評價模型可以將一公司之盈餘與股價連結在一起。根據此理論模型可導出對前述股價變動及本益比對數值之二元自我相關模型或二元移動平均模型中係數的限制。由於本文放鬆了永久性盈餘必須為隨機漫步的假設，只要其一階差分為恆定(stationary)即可，因此需要另一個限制式幫助我們做認定的工

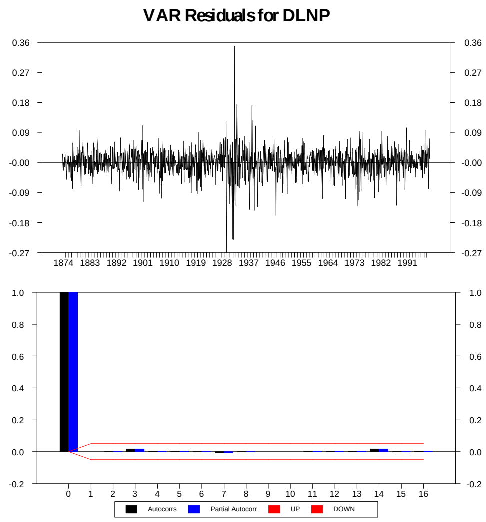
作，前述的理論關係所隱含的限制式恰可以幫助我們決定股價及盈餘數列中的永久性及暫時性部份。

在計量模型部份，我們先決定用以認定永久性及暫時性部分的股價變動及價格盈餘差數（本益比的對數值）的二元移動平均及自我相關模式；繼而再導出二元移動平均模式與二元自我相關模式間的關係，接著再利用理論關係協助認定工作。（詳細過程因過於繁瑣故為列入此報告中）

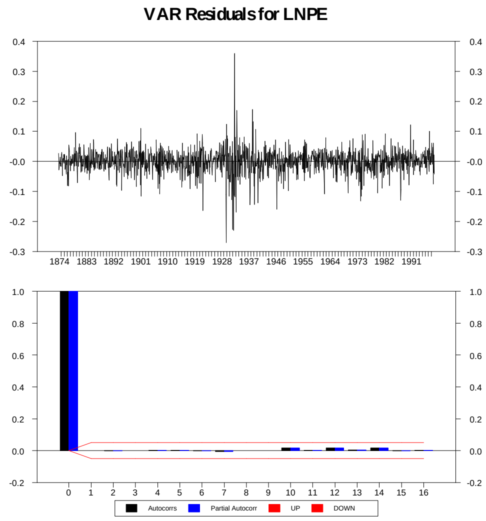
在資料蒐集與處理部份，本研究利用美國股市及盈餘資料從事實證分析。主要原因是台灣股市資料非常有限，無法估計我們所欲選用的模式，再者，亦沒有加總的盈餘資訊可供利用。本文最後採用的為自 1871 年 1 月起至 1998 年 12 月的月資料，達 1535 筆。所有的資料都以消費者物價指數平減。

資料的初步分析—單根及共積檢定：本研究首先利用 Dickey and Fuller (1979)及 Phillips and Perron (1988)等的單根檢定(unit root test)來探討價格及盈餘數列是否為非恆定，結果顯示價格數列及加權平均的盈餘數列均具有單根性質（此與 Lee and Wang, 1994 的結果相同）。此外，亦檢查各變數（包括價格序列、盈餘序列、價格盈餘差數序列、各變數的對數值、所有變數（含對數值）的一階差分等之自我相關情形，並觀察季節性效果，其結果均在後序分析中納入考慮。接著，利用 Engle-Granger (1987), Johanson (1988)及 Stock-Watson (1988)之檢定方法對股價變動及價格盈餘差數兩時間序列做共積之檢定 (cointegration tests)並估計共積向量，結果發現確有共積現象。

其次針對二元移動平均模型加上理論限制式對於股價永久性及暫時性部份做認定。此處尚須針對二元自我相關模型的落後期數(lags)做一決定，詳見所附的統計分析結果。由圖一及圖二可發現配適的結果大致良好。利用前述得到的二元移動平均模型，我們再從事變異數分解以了解股價變動預測誤差變異數被盈餘永久性及暫時性衝擊解釋的部份。 除此之外，還可以將股價變動序列分解為兩部份：一部份是目前及過去盈餘永久性衝擊的累積效果，另一部份是目前及過去盈餘暫時性衝擊的累積效果。在此部份得到的結果可用來說明平均數復歸現象到底是由於盈餘永久性的衝擊還是由於盈餘暫時性的衝擊所造成。



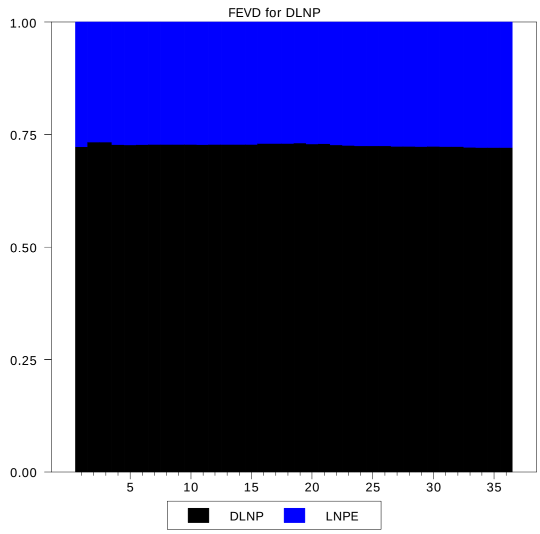
圖一：股價變動的殘差分析



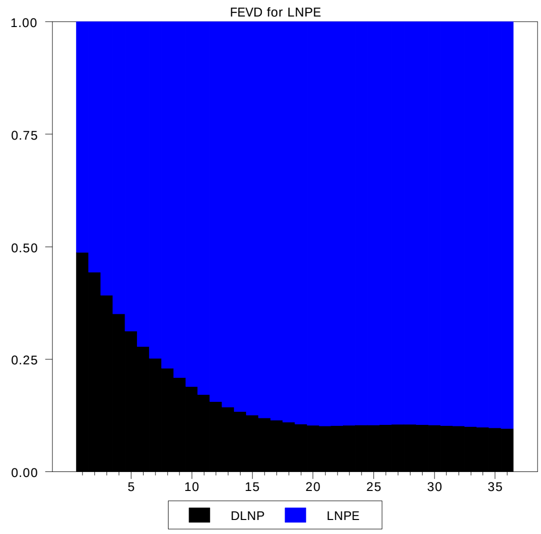
圖二：股價盈餘差數的殘差分析

圖三中黑色部份係股價變異由盈餘永久性衝擊所解釋的部份，而藍色部份則係股價變異由盈餘暫時性衝擊所解

釋的部份。可發現股價的變動大部份可以為盈餘永久性衝擊所解釋，唯暫時性衝擊所可解釋的部份亦相當高。



圖三：股價變動之變異數分解

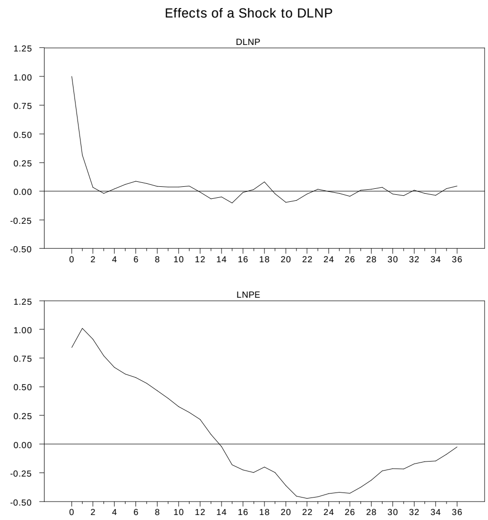


圖四：股價盈餘差數之變異數分解

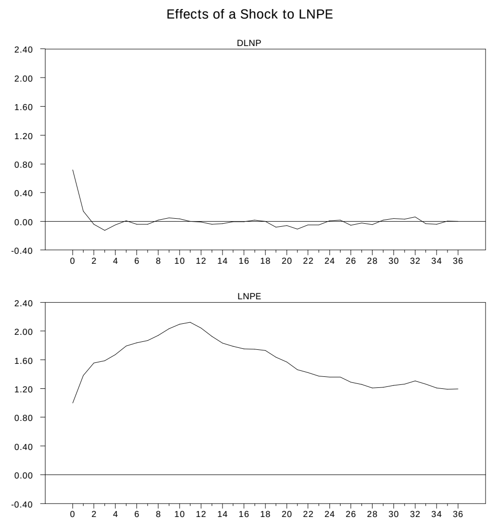
顯示投資人並未能分清盈餘的永久性及暫時性的衝擊。

圖四中黑色部份係股價盈餘差數變異由盈餘永久性衝擊所解釋的部份，而藍色部份則係股價盈餘差數變異由盈餘暫時性衝擊所解釋的部份。由圖中可發現股價盈餘差數的變異主要源於盈餘暫時性的衝擊，這也顯示股價相對於盈餘在盈餘有暫時性的衝擊時會有較劇烈的反應。

至於盈餘永久性及暫時性部份的動態效果可用脈衝反應分析(impulse response analysis)分析，目的是想要了解盈餘的永久性及暫時性衝擊對股價變動及價格盈餘差數（即本益比的對數值）的影響，如同變異數分解的部份我們也考慮了 36 期，即三年。此係將二元移動平均模型係數在考慮了前述理論模型限制後而畫出的。(請亦參照所附之統計分析結果)



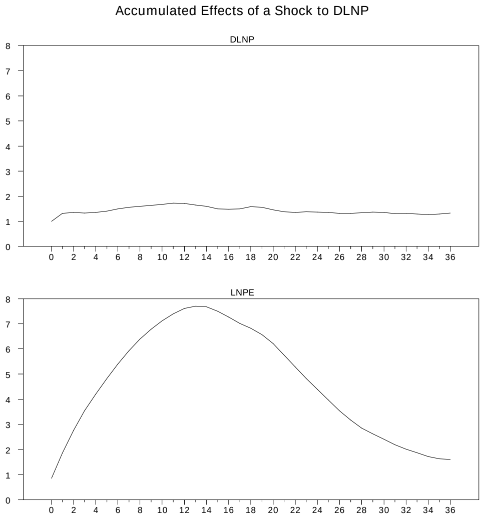
圖五：二變數對盈餘永久性
衝擊之脈衝反應分析



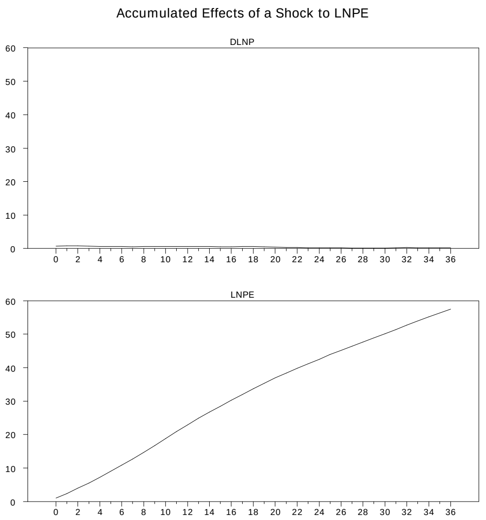
圖六：二變數對盈餘暫時性
衝擊之脈衝反應分析

圖五的上半部顯示永久性的盈餘衝擊對股價的變化有相當強烈的正面影響，但到了第三個月，其影響大為減小。至於暫時性盈餘的衝擊由圖六的上半部可看出也有

類似的現象，不過幅度較小。圖五的下半部顯示永久性的盈餘衝擊對股價盈餘差數的變化有相當強烈的正面影響，隨後漸漸下降，到了兩年後又開始回升；至於暫時性盈餘的衝擊由圖六的下半部可看出其影響力一直很大。



圖七：二變數對盈餘永久性
衝擊之脈衝累積反應分析



圖八：二變數對盈餘暫時性
衝擊之脈衝累積反應分析

由圖七的上半部可看出永久性的盈餘衝擊對股價變化的累積影響一直很穩定，至於暫時性盈餘的衝擊由圖八的上半部可看出有漸漸下降的現象，不過幅度較小。圖七的下半部顯示永久性的盈餘衝擊對股價盈餘差數變化的累積影響相當強，在約一年後達到最高峰，隨後漸漸下降；至於暫時性盈餘的衝擊由圖八的下半部可看出其累積影響愈來愈大。

以上的分析幫助我們了解股價的變動有多少是來自於盈餘永久性的衝擊、有多少是來自於盈餘暫時性的衝擊，結果顯示投資人理性的程度並非很高。另外，也可以知道盈餘股價差數（本益比對數值）是如何受到盈餘的兩種衝擊的影響。本研究的結果指出投資人並無法區分盈餘中的永久性及暫時性部份，這可以解釋股票平均數復歸 (mean-reverting) 現象造成的可能原因為股票報酬率中有很大一部份的性質為暫時的。股價盈餘差數的變動主要源於盈餘暫時性的衝擊，這也顯示股價相對於盈餘在盈餘有暫時性的衝擊時會有較劇烈的反應。此外，我們也可利用股價盈餘差數來預測未來的股票報酬率。

四、計畫成果自評

本研究所探討的題目大致依原計畫所欲探討項目執行，不過本文尚有許多可以延伸的地方，須待進一步的研究。部份結果有些奇特，例如：股價盈餘差數對暫時性盈餘的累積影響會隨著時間不斷增加，其原因值得探究。由於電腦計算能力的關係，無法加大脈衝反應的研究期間，此亦須待將來再做更深入的分析。

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附件

VAR **分析**

資料：1871:02 **至** 1998:12

Dependent Variable DLNP - Estimation by Least Squares
Monthly Data From 1874:02 To 1998:12
Usable Observations 1499 Degrees of Freedom 1425

Centered R**2 0.153731 R Bar **2 0.110378
Uncentered R**2 0.160506 T x R**2 240.598
Mean of Dependent Variable 0.0036976219
Std Error of Dependent Variable 0.0411742082
Standard Error of Estimate 0.0388354141
Sum of Squared Residuals 2.1491698811
Durbin-Watson Statistic 1.999917

Variable	Coeff	Std Error	T-Stat	Signif
1. DLNP{1}	0.4962	0.1114	4.45248	0.00000915
2. DLNP{2}	-0.1571	0.1469	-1.06947	0.28503955
3. DLNP{3}	0.1170	0.1474	0.79382	0.42743133
4. DLNP{4}	-0.0962	0.1559	-0.61719	0.53720873
5. DLNP{5}	7.6332e-003	0.1575	0.04847	0.96134644
6. DLNP{6}	0.2117	0.1574	1.34538	0.17871586
7. DLNP{7}	-0.0686	0.1574	-0.43584	0.66301530
8. DLNP{8}	-0.1342	0.1574	-0.85227	0.39420689
9. DLNP{9}	3.6506e-003	0.1574	0.02319	0.98150473
10. DLNP{10}	0.0277	0.1574	0.17577	0.86049806
11. DLNP{11}	0.0783	0.1560	0.50199	0.61575542
12. DLNP{12}	-0.1228	0.1538	-0.79844	0.42474680
13. DLNP{13}	0.0159	0.1566	0.10162	0.91906975
14. DLNP{14}	-0.0313	0.1591	-0.19701	0.84385056
15. DLNP{15}	-0.1948	0.1590	-1.22499	0.22078269
16. DLNP{16}	0.1879	0.1599	1.17566	0.23992532
17. DLNP{17}	-0.0804	0.1601	-0.50236	0.61549283
18. DLNP{18}	0.2885	0.1601	1.80171	0.07180175
19. DLNP{19}	-0.1035	0.1603	-0.64594	0.51842077
20. DLNP{20}	-0.2474	0.1603	-1.54364	0.12289753
21. DLNP{21}	0.1574	0.1603	0.98170	0.32641575
22. DLNP{22}	-0.0615	0.1603	-0.38329	0.70156162
23. DLNP{23}	0.0853	0.1573	0.54182	0.58802967
24. DLNP{24}	-0.2053	0.1532	-1.34043	0.18032057
25. DLNP{25}	0.0552	0.1551	0.35619	0.72175352
26. DLNP{26}	0.0878	0.1562	0.56192	0.57425627
27. DLNP{27}	-0.0370	0.1563	-0.23643	0.81313267
28. DLNP{28}	0.0794	0.1567	0.50674	0.61241389
29. DLNP{29}	-0.0931	0.1566	-0.59482	0.55205827
30. DLNP{30}	-0.0717	0.1563	-0.45855	0.64662525
31. DLNP{31}	0.0354	0.1563	0.22670	0.82069094
32. DLNP{32}	-0.0619	0.1563	-0.39578	0.69232571
33. DLNP{33}	0.1664	0.1563	1.06484	0.28712765
34. DLNP{34}	-0.1096	0.1562	-0.70193	0.48284005
35. DLNP{35}	0.0670	0.1181	0.56722	0.57065293
36. DLNP{36}	7.5652e-004	0.0271	0.02796	0.97770092
37. LNPE{1}	-0.2151	0.1088	-1.97661	0.04827870
38. LNPE{2}	0.2994	0.2297	1.30346	0.19262790
39. LNPE{3}	-0.2472	0.2485	-0.99491	0.31994879
40. LNPE{4}	0.2794	0.2560	1.09136	0.27530107
41. LNPE{5}	-0.0923	0.2664	-0.34643	0.72907203
42. LNPE{6}	-0.2240	0.2675	-0.83744	0.40248423
43. LNPE{7}	0.2753	0.2673	1.02966	0.30334367
44. LNPE{8}	0.0809	0.2674	0.30237	0.76241574
45. LNPE{9}	-0.1384	0.2674	-0.51769	0.60475359
46. LNPE{10}	-0.0369	0.2674	-0.13811	0.89017173
47. LNPE{11}	-0.0463	0.2667	-0.17371	0.86212085
48. LNPE{12}	0.1583	0.2628	0.60243	0.54698333
49. LNPE{13}	-0.1737	0.2631	-0.66028	0.50918336
50. LNPE{14}	0.0854	0.2692	0.31730	0.75106435
51. LNPE{15}	0.1165	0.2701	0.43125	0.66634887
52. LNPE{16}	-0.3024	0.2709	-1.11603	0.26459558
53. LNPE{17}	0.2668	0.2720	0.98111	0.32670463
54. LNPE{18}	-0.3308	0.2721	-1.21579	0.22426795
55. LNPE{19}	0.2749	0.2721	1.01034	0.31250495
56. LNPE{20}	0.1696	0.2722	0.62308	0.53332970
57. LNPE{21}	-0.4059	0.2722	-1.49119	0.13613234
58. LNPE{22}	0.2665	0.2722	0.97916	0.32766775
59. LNPE{23}	-0.1505	0.2704	-0.55651	0.57794739
60. LNPE{24}	0.2959	0.2621	1.12893	0.25911818
61. LNPE{25}	-0.2610	0.2605	-1.00159	0.31671105
62. LNPE{26}	-0.0849	0.2636	-0.32221	0.74734326
63. LNPE{27}	0.2038	0.2642	0.77114	0.44075126
64. LNPE{28}	-0.1633	0.2647	-0.61701	0.53732899
65. LNPE{29}	0.2230	0.2649	0.84174	0.40007597
66. LNPE{30}	-0.0612	0.2644	-0.23127	0.81713963
67. LNPE{31}	-0.1026	0.2642	-0.38813	0.69797811
68. LNPE{32}	0.1372	0.2643	0.51931	0.60362788
69. LNPE{33}	-0.3186	0.2643	-1.20566	0.22815063
70. LNPE{34}	0.2889	0.2642	1.09330	0.27444605
71. LNPE{35}	-0.1076	0.2442	-0.44048	0.65965382
72. LNPE{36}	0.0336	0.1145	0.29352	0.76916976
73. Constant	0.0179	0.0105	1.69986	0.08937486
74. TREND	4.9258e-006	2.4426e-006	2.01665	0.04391951

F-Tests, Dependent Variable DLNP

Variable	F-Statistic	Signif
DLNP	2.1290	0.0001267
LNPE	1.0610	0.3723377

Dependent Variable LNPE - Estimation by Least Squares
Monthly Data From 1874:02 To 1998:12
Usable Observations 1499 Degrees of Freedom 1425
Centered R**2 0.984613 R Bar **2 0.983825
Uncentered R**2 0.999782 T x R**2 1498.673
Mean of Dependent Variable 2.6074549133
Std Error of Dependent Variable 0.3128157969
Standard Error of Estimate 0.0397842515
Sum of Squared Residuals 2.2554710034
Durbin-Watson Statistic 1.999090

Variable	Coeff	Std Error	T-Stat	Signif
1. DLNP{1}	-0.389638140	0.114171583	-3.41274	0.00066115
2. DLNP{2}	-0.152227011	0.150523362	-1.01132	0.31203586
3. DLNP{3}	0.141442057	0.150981525	0.93682	0.34901144
4. DLNP{4}	-0.143920369	0.159701903	-0.90118	0.36764421
5. DLNP{5}	0.000891033	0.161321341	0.00552	0.99559381
6. DLNP{6}	0.215049347	0.161199177	1.33406	0.18239741
7. DLNP{7}	-0.094252576	0.161226668	-0.58460	0.55891148
8. DLNP{8}	-0.120513615	0.161251220	-0.74737	0.45496621
9. DLNP{9}	-0.015368488	0.161292313	-0.09528	0.92410309
10. DLNP{10}	0.026858862	0.161293391	0.16652	0.86776997
11. DLNP{11}	0.074046421	0.159858957	0.46320	0.64329286
12. DLNP{12}	0.161327806	0.157590840	1.02371	0.30614456
13. DLNP{13}	-0.261332398	0.160436661	-1.62888	

				0.10355902
14. DLNP{14}	-0.029132696	0.162994718	-0.17873	0.85817199
15. DLNP{15}	-0.196638959	0.162932897	-1.20687	0.22768220
16. DLNP{16}	0.198700002	0.163772073	1.21327	0.22522707
17. DLNP{17}	-0.103068154	0.164023423	-0.62837	0.52985927
18. DLNP{18}	0.294926006	0.164015177	1.79816	0.07236278
19. DLNP{19}	-0.108115399	0.164195227	-0.65846	0.51035127
20. DLNP{20}	-0.235151046	0.164199651	-1.43210	0.15233324
21. DLNP{21}	0.145260644	0.164265984	0.88430	0.37668269
22. DLNP{22}	-0.036175381	0.164257086	-0.22024	0.82571864
23. DLNP{23}	0.064810414	0.161187768	0.40208	0.68768529
24. DLNP{24}	0.013690315	0.156899526	0.08726	0.93048084
25. DLNP{25}	-0.127507724	0.158844958	-0.80272	0.42227154
26. DLNP{26}	0.097653381	0.160008909	0.61030	0.54176064
27. DLNP{27}	-0.030545898	0.160105169	-0.19079	0.84872007
28. DLNP{28}	0.084421988	0.160497054	0.52600	0.59896773
29. DLNP{29}	-0.095339837	0.160409956	-0.59435	0.55237164
30. DLNP{30}	-0.069147997	0.160089246	-0.43193	0.66585469
31. DLNP{31}	0.035899101	0.160102808	0.22423	0.82261414
32. DLNP{32}	-0.061843597	0.160098733	-0.38628	0.69934393
33. DLNP{33}	0.163714404	0.160100147	1.02257	0.30668241
34. DLNP{34}	-0.102728400	0.160014204	-0.64200	0.52097936
35. DLNP{35}	0.072323052	0.120976180	0.59783	0.55004912
36. DLNP{36}	0.003663277	0.027722020	0.13214	0.89488967
37. LNPE{1}	1.661690641	0.111496854	14.90348	0.00000000
38. LNPE{2}	-0.578204872	0.235296356	-2.45735	0.01411515
39. LNPE{3}	-0.291411050	0.254554592	-1.14479	0.25248921
40. LNPE{4}	0.364719587	0.262295433	1.39049	0.16459678
41. LNPE{5}	-0.131181768	0.272957350	-0.48059	0.63087858
42. LNPE{6}	-0.244677665	0.274013024	-0.89294	0.37203914
43. LNPE{7}	0.308785404	0.273864515	1.12751	0.25971607
44. LNPE{8}	0.057600859	0.273928293	0.21028	0.83348143
45. LNPE{9}	-0.125342173	0.273935463	-0.45756	0.64733765
46. LNPE{10}	-0.053227757	0.273960299	-0.19429	0.84597648
47. LNPE{11}	-0.024728589	0.273172119	-0.09052	0.92788367
48. LNPE{12}	-0.150517782	0.269215385	-0.55910	0.57618270
49. LNPE{13}	0.384803171	0.269559880	1.42752	0.15364804
50. LNPE{14}	-0.165293166	0.275785893	-0.59935	0.54903264
51. LNPE{15}	0.100958857	0.276744314	0.36481	0.71530801
52. LNPE{16}	-0.296567647	0.277537994	-1.06857	0.28544628
53. LNPE{17}	0.282588286	0.278617041	1.01425	0.31063402
54. LNPE{18}	-0.352099244	0.278730858	-1.26322	0.20671567
55. LNPE{19}	0.283828306	0.278771951	1.01814	0.30878522
56. LNPE{20}	0.159934046	0.278849851	0.57355	0.56636355
57. LNPE{21}	-0.385193158	0.278826556	-1.38148	0.16734815
58. LNPE{22}	0.234478838	0.278841695	0.84090	0.40054331
59. LNPE{23}	-0.124341797	0.277052174	-0.44880	0.65364214
60. LNPE{24}	0.084043514	0.268467000	0.31305	0.75428871
61. LNPE{25}	0.113603078	0.266903474	0.42563	0.67043915
62. LNPE{26}	-0.261316207	0.270056167	-0.96764	0.33339013
63. LNPE{27}	0.211887993	0.270695799	0.78275	0.43390213
64. LNPE{28}	-0.170398211	0.271182934	-0.62835	0.52987438
65. LNPE{29}	0.226143225	0.271416836	0.83320	0.40487423
66. LNPE{30}	-0.059407778	0.270890374	-0.21931	0.82644340
67. LNPE{31}	-0.110620298	0.270703658	-0.40864	0.68286539
68. LNPE{32}	0.143608682	0.270708369	0.53049	0.59585336
69. LNPE{33}	-0.311880198	0.270739235	-1.15196	0.24953160
70. LNPE{34}	0.278524939	0.270692932	1.02893	0.30368569
71. LNPE{35}	-0.114609830	0.250144134	-0.45818	0.64689646
72. LNPE{36}	0.043643294	0.117304381	0.37205	0.70990968
73. Constant	0.025495122	0.010767364	2.36781	0.01802638
74. TREND	0.000004174	0.000002502	1.66824	0.09548867

F-Tests, Dependent Variable LNPE

Variable	F-Statistic	Signif
DLNP	2.4858	0.0000032
LNPE	2331.5622	0.0000000

The Standard Deviation and Correlation Matrix of the Reduced-Form Residuals

DLNP	LNPE
0.0379	0.0388
1.0000	
0.9706	1.0000

Residual Analysis (w/ significance underneath)

	Skewness	Kurtosis	JB(2)	LB(16)	LM(16) ARCH(16)
DLNP	-0.2678	12.2788	5395.3319	0.1933	14.3885 218.8267

0.0000 NA 0.5698 0.0000

LNPE -0.2698 12.1778 5279.2137 0.1703 14.2947 206.2142

0.0000 NA 0.5768 0.0000

The tests are asymptotically Chi-squared

JB: Jarque-Bera normality test

LB: Ljung-Box test for residual autocorrelation

LM: Lagrange multiplier test for residual autocorrelation

ARCH: Lagrange multiplier test for residual ARCH

Portmanteau Test for Joint Residual Autocorrelation

Chi-Sqr(56): 0.6321

Significance: 1.0000

Testing for Multivariate Normality

	Skewness	Kurtosis	Joint
Statistic:	18826.7874	1.9829e+006	2.0018e+006
Significance:	0.0000	NA	0.0000

Log-Likelihood 7660.0143

Log-Determinant of the Residual

Variance-Covariance Matrix -15.8959

Model Selection Criteria

AIC	-15.6985
FPE	-15.4997
HQ	-15.5030
SIC/BIC	-15.1739

The Estimated Sum of the VMA(oo) coefficients and standard errors

DLNP	LNPE
3.42384	-2.45985
-194.45626	237.97236
1.02946	1.14887
64.63323	72.12990

Vector Moving Average Representation

Shock to:

DLNP LNPE

Lag(0)

1.0000 0.0000

0.0000 1.0000

Standard Error

0.0000 0.0000

0.0000 0.0000

Lag(1)

0.4962 -0.2151

-0.3896 1.6617

Standard Error

0.1114 0.1088

0.1142 0.1115

Lag(2)

0.1729 -0.1648

-0.9930 2.2668

Standard Error

0.1180 0.1151

0.1899 0.1853

Lag(3)

0.2218 -0.2854

-1.4263 2.6115

Standard Error

0.1223 0.1192

0.2542 0.2479

Lag(4)

0.1506 -0.1554

-1.8688 3.0152

Standard Error

0.1245 0.1215

0.2986 0.2911

Lag(5)

0.1316 -0.0861

-2.2719 3.4263

Standard Error

0.1251 0.1220

0.3365 0.3281

Lag(6)

0.3068 -0.2614

-2.4424 3.5935

Standard Error

0.1252 0.1221

0.3730 0.3636

Lag(7)

0.2533 -0.2229

-2.6324 3.7564

Standard Error

0.1255 0.1224

0.4073 0.3970

Lag(8)

0.0699 -0.0343

-2.9502 4.0604

Standard Error

0.1257 0.1226

0.4390 0.4279

Lag(9)

-0.0059 0.0510

-3.3170 4.4160

Standard Error

0.1258 0.1227

0.4699 0.4579

Lag(10)

0.0182 0.0217

-3.6298 4.7025

Standard Error

0.1258 0.1227

0.5007 0.4878

Lag(11)

0.1146 -0.0809

-3.8122 4.8601

Standard Error

0.1240 0.1210

0.5307 0.5169

Lag(12)

0.0007 -0.0105

-3.7937 4.7659

Standard Error

0.1240 0.1210

0.5597 0.5450

Lag(13)

-0.0773 0.0138

-3.8817 4.7134

Standard Error

0.1237 0.1207

0.5848   0.5693

Lag(14)
-0.0608   0.0120
-3.9618   4.6804
Standard Error
0.1236   0.1206
0.6058   0.5896

Lag(15)
-0.2492   0.1738
-4.2581   4.8446
Standard Error
0.1237   0.1207
0.6238   0.6070

Lag(16)
-0.0124   0.0033
-4.3020   4.8433
Standard Error
0.1240   0.1210
0.6403   0.6230

Lag(17)
-0.0069   0.0251
-4.3507   4.8741
Standard Error
0.1237   0.1209
0.6555   0.6378

Lag(18)
0.2113 -0.1547
-4.1833   4.7343
Standard Error
0.1237   0.1209
0.6700   0.6520

Lag(19)
0.1157 -0.1631
-4.1106   4.5904
Standard Error
0.1239   0.1211
0.6835   0.6652

Lag(20)
-0.1139   0.0212
-4.2582   4.6293
Standard Error
0.1241   0.1213
0.6953   0.6767

Lag(21)
0.0279 -0.1282
-4.2604   4.5236
Standard Error
0.1244   0.1215
0.7060   0.6871

Lag(22)
0.0507 -0.0873
-4.2176   4.4510
Standard Error
0.1252   0.1222
0.7153   0.6962

Lag(23)
0.1486 -0.1562
-4.0829   4.3050
Standard Error
0.1233   0.1204
0.7242   0.7052

Lag(24)
-0.0272   0.0293
-3.9936   4.2316
Standard Error
0.1233   0.1202
0.7325   0.7136

Lag(25)
-0.0786   0.0712
-3.9570   4.2021
Standard Error
0.1226   0.1195
0.7409   0.7221

Lag(26)
0.0117 -0.0644
-3.8261   4.0355
Standard Error
0.1223   0.1191
0.7490   0.7302

Lag(27)
0.0677 -0.0708
-3.6308   3.8672
Standard Error
0.1224   0.1192
0.7563   0.7375

Lag(28)
0.1375 -0.1430
-3.3638   3.6244
Standard Error
0.1223   0.1192
0.7631   0.7442

Lag(29)
0.0567 -0.0251
-3.1762   3.4960
Standard Error
0.1223   0.1192
0.7689   0.7500

Lag(30)
-0.1507   0.1482
-3.1953   3.5408
Standard Error
0.1222   0.1191
0.7745   0.7556

Lag(31)
-0.1668   0.1511
-3.2335   3.5851
Standard Error
0.1218   0.1188
0.7802   0.7612

Lag(32)
-0.1097   0.1416
-3.2202   3.6220
Standard Error
0.1217   0.1188
0.7858   0.7669

Lag(33)
0.0245 -0.0506
-3.0649   3.4619
Standard Error
0.1217   0.1188
0.7918   0.7728

Lag(34)
-0.0043 -0.0374
-2.9420   3.3211
Standard Error

0.1213   0.1184
0.7969   0.7779

Lag(35)
0.0508 -0.0322
-2.7572   3.1728
Standard Error
0.0816   0.0770
0.7994   0.7794

Lag(36)
0.1102 -0.0783
-2.6068   3.0674
Standard Error
0.0808   0.0769
0.8009   0.7804

Accumulation to Lag(0)
1.0000   0.0000
0.0000   1.0000
Standard Error
0.0000   0.0000
0.0000   0.0000

Accumulation to Lag(1)
1.4962 -0.2151
-0.3896   2.6617
Standard Error
0.1114   0.1088
0.1142   0.1115

Accumulation to Lag(2)
1.6691 -0.3800
-1.3827   4.9285
Standard Error
0.1843   0.1798
0.2888   0.2820

Accumulation to Lag(3)
1.8909 -0.6654
-2.8090   7.5401
Standard Error
0.2437   0.2376
0.5186   0.5060

Accumulation to Lag(4)
2.0415 -0.8208
-4.6778 10.5553
Standard Error
0.2838   0.2766
0.7823   0.7630

Accumulation to Lag(5)
2.1732 -0.9068
-6.9497 13.9816
Standard Error
0.3174   0.3094
1.0755   1.0489

Accumulation to Lag(6)
2.4800 -1.1682
-9.3921 17.5751
Standard Error
0.3495   0.3408
1.3994   1.3647

Accumulation to Lag(7)
2.7332 -1.3911
-12.0245 21.3315
Standard Error
0.3816   0.3720
1.7528   1.7092

Accumulation to Lag(8)
2.8031 -1.4254
-14.9747 25.3919
Standard Error
0.4132   0.4027
2.1334   2.0802

Accumulation to Lag(9)
2.7972 -1.3744
-18.2917 29.8079
Standard Error
0.4439   0.4326
2.5408   2.4772

Accumulation to Lag(10)
2.8154 -1.3527
-21.9215 34.5104
Standard Error
0.4741   0.4619
2.9752   2.9003

Accumulation to Lag(11)
2.9300 -1.4336
-25.7337 39.3705
Standard Error
0.5036   0.4905
3.4364   3.3493

Accumulation to Lag(12)
2.9308 -1.4441
-29.5274 44.1364
Standard Error
0.5329   0.5188
3.9227   3.8225

Accumulation to Lag(13)
2.8534 -1.4303
-33.4091 48.8497
Standard Error
0.5602   0.5452
4.4289   4.3148

Accumulation to Lag(14)
2.7926 -1.4183
-37.3709 53.5301
Standard Error
0.5840   0.5683
4.9482   4.8198

Accumulation to Lag(15)
2.5434 -1.2444
-41.6291 58.3747
Standard Error
0.6051   0.5887
5.4765   5.3332

Accumulation to Lag(16)
2.5311 -1.2411
-45.9311 63.2180
Standard Error
0.6226   0.6056
6.0111   5.8526

Accumulation to Lag(17)
2.5242 -1.2160
-50.2818 68.0921
Standard Error
0.6389   0.6214
6.5517   6.3776

Accumulation to Lag(18)

2.7355 -1.3707
-54.4651 72.8264
Standard Error
0.6548 0.6370
7.0991 6.9092

Accumulation to Lag(19)
2.8511 -1.5338
-58.5757 77.4168
Standard Error
0.6720 0.6537
7.6543 7.4482

Accumulation to Lag(20)
2.7372 -1.5126
-62.8339 82.0461
Standard Error
0.6879 0.6691
8.2149 7.9922

Accumulation to Lag(21)
2.7651 -1.6408
-67.0943 86.5697
Standard Error
0.7010 0.6816
8.7787 8.5390

Accumulation to Lag(22)
2.8158 -1.7281
-71.3119 91.0207
Standard Error
0.7116 0.6919
9.3429 9.0861

Accumulation to Lag(23)
2.9644 -1.8844
-75.3948 95.3257
Standard Error
0.7215 0.7018
9.9075 9.6335

Accumulation to Lag(24)
2.9372 -1.8551
-79.3884 99.5573
Standard Error
0.7318 0.7121
10.4725 10.1815

Accumulation to Lag(25)
2.8586 -1.7839
-83.3455 103.7595
Standard Error
0.7424 0.7227
11.0393 10.7313

Accumulation to Lag(26)
2.8703 -1.8483
-87.1716 107.7950
Standard Error
0.7526 0.7327
11.6086 11.2838

Accumulation to Lag(27)
2.9380 -1.9191
-90.8024 111.6622
Standard Error
0.7618 0.7418
12.1795 11.8378

Accumulation to Lag(28)
3.0755 -2.0621
-94.1662 115.2865
Standard Error
0.7711 0.7509
12.7523 12.3937

Accumulation to Lag(29)
3.1322 -2.0872
-97.3424 118.7826
Standard Error
0.7804 0.7601
13.3264 12.9508

Accumulation to Lag(30)
2.9816 -1.9390
-100.5377 122.3233
Standard Error
0.7903 0.7698
13.9027 13.5100

Accumulation to Lag(31)
2.8148 -1.7880
-103.7712 125.9084
Standard Error
0.7997 0.7790
14.4826 14.0728

Accumulation to Lag(32)
2.7051 -1.6464
-106.9914 129.5304
Standard Error
0.8084 0.7875
15.0670 14.6398

Accumulation to Lag(33)
2.7296 -1.6970
-110.0563 132.9923
Standard Error
0.8172 0.7962
15.6573 15.2125

Accumulation to Lag(34)
2.7253 -1.7344
-112.9983 136.3134
Standard Error
0.8255 0.8044
16.2529 15.7902

Accumulation to Lag(35)
2.7761 -1.7666
-115.7556 139.4862
Standard Error
0.8323 0.8103
16.8550 16.3744

Accumulation to Lag(36)
2.8863 -1.8449
-118.3624 142.5536
Standard Error
0.8389 0.8162
17.4634 16.9643

Impulse Response Analysis

B, where VCOV = inv(B)*D*inv(B)'

DLNP	LNPE
2.5290	-1.8170
-2.1283	2.5290

D^.5 (i.e., (D^.5)*(D^.5)' = D)

0.0322	0.0000
0.0000	0.0278

The decomposition matrix, inv(B)*SQRT(D)

DLNP	LNPE
0.0322	0.0200
0.0271	0.0278

Responses to innovations in DLNP

	DLNP	LNPE
0	1.00000	0.84153
1	0.31519	1.00872
2	0.03420	0.91457
3	-0.01836	0.77139
4	0.01981	0.66859
5	0.05922	0.61140
6	0.08683	0.58163
7	0.06571	0.52871
8	0.04101	0.46674
9	0.03701	0.39921
10	0.03643	0.32748
11	0.04657	0.27768
12	-0.00809	0.21689
13	-0.06569	0.08474
14	-0.05069	-0.02314
15	-0.10292	-0.18125
16	-0.00957	-0.22628
17	0.01424	-0.24903
18	0.08109	-0.19925
19	-0.02158	-0.24771
20	-0.09608	-0.36243
21	-0.07998	-0.45367
22	-0.02279	-0.47198
23	0.01710	-0.46012
24	-0.00258	-0.43261
25	-0.01869	-0.42082
26	-0.04252	-0.43011
27	0.00814	-0.37651
28	0.01723	-0.31380
29	0.03560	-0.23417
30	-0.02599	-0.21563
31	-0.03963	-0.21653
32	0.00940	-0.17221
33	-0.01814	-0.15156
34	-0.03570	-0.14729
35	0.02372	-0.08727
36	0.04431	-0.02554

Responses to innovations in LNPE

	DLNP	LNPE
0	0.71845	1.00000
1	0.14138	1.38176
2	-0.04061	1.55339
3	-0.12604	1.58683
4	-0.04722	1.67259
5	0.00852	1.79405
6	-0.04098	1.83876
7	-0.04092	1.86516
8	0.01590	1.94082
9	0.04676	2.03293
10	0.03475	2.09469
11	0.00147	2.12122
12	-0.00996	2.04028
13	-0.04173	1.92459
14	-0.03167	1.83402
15	-0.00521	1.78538
16	-0.00555	1.75250
17	0.02016	1.74834
18	-0.00291	1.72883
19	-0.07999	1.63710
20	-0.06065	1.57010
21	-0.10817	1.46272
22	-0.05089	1.42087
23	-0.04949	1.37165
24	0.00971	1.36241
25	0.01473	1.35922
26	-0.05603	1.28667
27	-0.02215	1.25860
28	-0.04415	1.20765
29	0.01566	1.21412
30	0.03991	1.24512
31	0.03126	1.26200
32	0.06273	1.30844
33	-0.03305	1.25998
34	-0.04042	1.20735
35	0.00433	1.19184
36	0.00088	1.19452

Responses of DLNP to innovations in

	DLNP	LNPE
0	1.00000	0.71845
1	0.31519	0.14138
2	0.03420	-0.04061
3	-0.01836	-0.12604
4	0.01981	-0.04722
5	0.05922	0.00852
6	0.08683	-0.04098
7	0.06571	-0.04092
8	0.04101	0.01590
9	0.03701	0.04676
10	0.03643	0.03475
11	0.04657	0.00147
12	-0.00809	-0.00996
13	-0.06569	-0.04173
14	-0.05069	-0.03167
15	-0.10292	-0.00521
16	-0.00957	-0.00555
17	0.01424	0.02016
18	0.08109	-0.00291
19	-0.02158	-0.07999
20	-0.09608	-0.06065
21	-0.07998	-0.10817
22	-0.02279	-0.05089
23	0.01710	-0.04949
24	-0.00258	0.00971
25	-0.01869	0.01473
26	-0.04252	-0.05603
27	0.00814	-0.02215
28	0.01723	-0.04415
29	0.03560	0.01566
30	-0.02599	0.03991
31	-0.03963	0.03126
32	0.00940	0.06273
33	-0.01814	-0.03305
34	-0.03570	-0.04042
35	0.02372	0.00433
36	0.04431	0.00088

Responses of LNPE to innovations in

	DLNP	LNPE
0	0.84153	1.00000
1	1.00872	1.38176
2	0.91457	1.55339
3	0.77139	1.58683
4	0.66859	1.67259
5	0.61140	1.79405
6	0.58163	1.83876
7	0.52871	1.86516
8	0.46674	1.94082
9	0.39921	2.03293
10	0.32748	2.09469
11	0.27768	2.12122
12	0.21689	2.04028
13	0.08474	1.92459

14	-0.02314	1.83402
15	-0.18125	1.78538
16	-0.22628	1.75250
17	-0.24903	1.74834
18	-0.19925	1.72883
19	-0.24771	1.63710
20	-0.36243	1.57010
21	-0.45367	1.46272
22	-0.47198	1.42087
23	-0.46012	1.37165
24	-0.43261	1.36241
25	-0.42082	1.35922
26	-0.43011	1.28667
27	-0.37651	1.25860
28	-0.31380	1.20765
29	-0.23417	1.21412
30	-0.21563	1.24512
31	-0.21653	1.26200
32	-0.17221	1.30844
33	-0.15156	1.25998
34	-0.14729	1.20735
35	-0.08727	1.19184
36	-0.02554	1.19452

Accumulated responses to innovations in DLNP

	DLNP	LNPE
0	1.00000	0.84153
1	1.31519	1.85025
2	1.34938	2.76482
3	1.33102	3.53621
4	1.35083	4.20480
5	1.41005	4.81620
6	1.49688	5.39783
7	1.56258	5.92654
8	1.60360	6.39327
9	1.64061	6.79248
10	1.67704	7.11997
11	1.72361	7.39765
12	1.71551	7.61453
13	1.64982	7.69927
14	1.59913	7.67613
15	1.49621	7.49488
16	1.48664	7.26861
17	1.50088	7.01958
18	1.58197	6.82033
19	1.56039	6.57262
20	1.46430	6.21020
21	1.38432	5.75652
22	1.36153	5.28455
23	1.37863	4.82442
24	1.37605	4.39181
25	1.35737	3.97099
26	1.31484	3.54088
27	1.32298	3.16437
28	1.34021	2.85058
29	1.37581	2.61640
30	1.34982	2.40077
31	1.31019	2.18423
32	1.31959	2.01202
33	1.30146	1.86047
34	1.26575	1.71318
35	1.28947	1.62591
36	1.33379	1.60037

Accumulated responses to innovations in LNPE

	DLNP	LNPE
0	0.71845	1.00000
1	0.85983	2.38176
2	0.81921	3.93515
3	0.69318	5.52198
4	0.64595	7.19457
5	0.65448	8.98862
6	0.61349	10.82737
7	0.57258	12.69254
8	0.58848	14.63336
9	0.63524	16.66629
10	0.66999	18.76098
11	0.67146	20.88220
12	0.66150	22.92248
13	0.61976	24.84706
14	0.58809	26.68109
15	0.58288	28.46647
16	0.57733	30.21897
17	0.59748	31.96731
18	0.59457	33.69613
19	0.51458	35.33324
20	0.45393	36.90333
21	0.34576	38.36606
22	0.29488	39.78693
23	0.24539	41.15858
24	0.25510	42.52099
25	0.26983	43.88020
26	0.21380	45.16688
27	0.19165	46.42548
28	0.14750	47.63313
29	0.16316	48.84725
30	0.20307	50.09237
31	0.23433	51.35438
32	0.29706	52.66282
33	0.26400	53.92280
34	0.22358	55.13015
35	0.22790	56.32200
36	0.22878	57.51652

Accumulated responses of DLNP to innovations in

	DLNP	LNPE
0	1.00000	0.71845
1	1.31519	0.85983
2	1.34938	0.81921
3	1.33102	0.69318
4	1.35083	0.64595
5	1.41005	0.65448
6	1.49688	0.61349
7	1.56258	0.57258
8	1.60360	0.58848
9	1.64061	0.63524
10	1.67704	0.66999
11	1.72361	0.67146
12	1.71551	0.66150
13	1.64982	0.61976
14	1.59913	0.58809
15	1.49621	0.58288
16	1.48664	0.57733
17	1.50088	0.59748
18	1.58197	0.59457
19	1.56039	0.51458
20	1.46430	0.45393
21	1.38432	0.34576
22	1.36153	0.29488
23	1.37863	0.24539
24	1.37605	0.25510
25	1.35737	0.26983
26	1.31484	0.21380
27	1.32298	0.19165
28	1.34021	0.14750
29	1.37581	0.16316
30	1.34982	0.20307
31	1.31019	0.23433
32	1.31959	0.29706
33	1.30146	0.26400
34	1.26575	0.22358
35	1.28947	0.22790
36	1.33379	0.22878

Accumulated responses of LNPE to innovations in

	DLNP	LNPE
0	0.84153	1.00000
1	1.85025	2.38176
2	2.76482	3.93515
3	3.53621	5.52198
4	4.20480	7.19457
5	4.81620	8.98862
6	5.39783	10.82737
7	5.92654	12.69254
8	6.39327	14.63336
9	6.79248	16.66629
10	7.11997	18.76098
11	7.39765	20.88220
12	7.61453	22.92248
13	7.69927	24.84706
14	7.67613	26.68109
15	7.49488	28.46647
16	7.26861	30.21897
17	7.01958	31.96731
18	6.82033	33.69613
19	6.57262	35.33324
20	6.21020	36.90333
21	5.75652	38.36606
22	5.28455	39.78693
23	4.82442	41.15858
24	4.39181	42.52099
25	3.97099	43.88020
26	3.54088	45.16688
27	3.16437	46.42548
28	2.85058	47.63313
29	2.61640	48.84725
30	2.40077	50.09237
31	2.18423	51.35438
32	2.01202	52.66282
33	1.86047	53.92280
34	1.71318	55.13015
35	1.62591	56.32200
36	1.60037	57.51652

Accumulated Impulse Responses
Normalized so each reduced form shock = 1
(i,j)th element is the accumulated effect
on variable i of a shock to variable j

Out to 36 steps

DLNP	LNPE
1.33379	0.22878
1.60037	57.51652

Out to oo steps

DLNP	LNPE
1.35381	0.00000
5.80404	98.26593

Forecast Error Variance Decomposition
The forecast standard error and
the proportion of forecast error variance
from innovations in

DLNP LNPE
Period 0
0.03786 0.03879

0.72234 0.27766
0.48743 0.51257
Period 1
0.03940 0.06349

0.73358 0.26642
0.44337 0.55663
Period 2
0.03943 0.08221

0.73318 0.26682
0.39263 0.60737
Period 3
0.03959 0.09652

0.72751 0.27249
0.35096 0.64904
Period 4
0.03961 0.10926

0.72678 0.27322
0.31270 0.68730
Period 5
0.03966 0.12168

0.72739 0.27261
0.27825 0.72175
Period 6
0.03977 0.13328

0.72814 0.27186
0.25164 0.74836
Period 7
0.03985 0.14400

0.72831 0.27169
0.22953 0.77047
Period 8
0.03987 0.15449

0.72852 0.27148
0.20887 0.79113
Period 9
0.03991 0.16498

0.72799 0.27201
0.18921 0.81079
Period 10
0.03994 0.17526

0.72780 0.27220
0.17130 0.82870
Period 11
0.03997 0.18511

0.72818 0.27182
0.15588 0.84412
Period 12
0.03997 0.19371

0.72816 0.27184
0.14364 0.85636
Period 13
0.04004 0.20097

0.72831 0.27169
0.13364 0.86636
Period 14
0.04008 0.20732

0.72841 0.27159
0.12558 0.87442
Period 15
0.04022 0.21325

0.73024 0.26976
0.11945 0.88055
Period 16
0.04022 0.21885

0.73024 0.26976
0.11452 0.88548
Period 17
0.04023 0.22432

0.73014 0.26986
0.11028 0.88972
Period 18
0.04031 0.22949

0.73126 0.26874
0.10615 0.89385
Period 19
0.04038 0.23408

0.72913 0.27087
0.10318 0.89682
Period 20
0.04053 0.23840

0.72945 0.27055
0.10188 0.89812
Period 21
0.04073 0.24227

0.72656 0.27344
0.10227 0.89773
Period 22
0.04076 0.24593

0.72578 0.27422
0.10307 0.89693
Period 23
0.04079 0.24931

0.72500 0.27500
0.10382 0.89618
Period 24
0.04079 0.25255

0.72497 0.27503
0.10422 0.89578
Period 25
0.04079 0.25571

0.72496 0.27504
0.10446 0.89554
Period 26
0.04085 0.25857

0.72421 0.27579
0.10503 0.89497
Period 27
0.04085 0.26120

0.72406 0.27594
0.10507 0.89493
Period 28
0.04087 0.26354

0.72346 0.27654
0.10469 0.89531
Period 29
0.04089 0.26579

0.72360 0.27640
0.10372 0.89628
Period 30
0.04091 0.26812

0.72318 0.27682
0.10260 0.89740
Period 31
0.04094 0.27049

0.72312 0.27688
0.10147 0.89853
Period 32
0.04098 0.27298

0.72183 0.27817
0.10004 0.89996
Period 33
0.04100 0.27525

0.72153 0.27847
0.09871 0.90129
Period 34
0.04103 0.27733

0.72121 0.27879
0.09753 0.90247
Period 35
0.04104 0.27931

0.72130 0.27870
0.09625 0.90375
Period 36
0.04106 0.28128

0.72163 0.27837
0.09492 0.90508