

# 結合費雪假說與新凱恩斯菲利浦假說下 通膨指數連結商品之定價

學生：林澤婷

指導教授：張嘉倩 博士

國立高雄應用科技大學金融資訊研究所碩士班

## 摘要

過去文獻上許多學者在制定通貨膨脹指數連結之衍生性金融商品定價時，通常只考慮通膨率本身的波動度，未考慮其他可能影響通膨率變動之因素。本論文根據「多元迴歸模型」建構出消費者物價指數動態過程並且使該模型滿足「費雪假說」和「新凱恩斯菲利浦假說」兩大假說。再者，根據此模型推導出通膨指數連結買權和通膨指數連結上限買權價格之封閉解。最後，在實證分析與數值分析中，本文將探討哪些總體因子對於通貨膨脹指數連結之衍生性金融商品有顯著的影響。結果顯示商業部門-單位勞工成本變動率以及國內生產毛額變動率和商業部門-單位勞工成本變動率的共變異數對通貨膨脹指數連結買權價格最具影響力。

**關鍵字：**費雪假說、新凱恩斯菲利浦假說、通膨指數連結買權、通膨指數連結上限買權

# **The Valuation of Inflation Index-Linked Derivatives with Fisher Hypothesis and New Keynesian Phillips Hypothesis**

Student: Ze-Ting Lin

Advisor: Dr. Chia-Chien Chang

Institute of Finance and Information  
National Kaohsiung University of Applied Sciences

## **Abstract**

In previous pricing models of inflation index-linked derivatives, the stochastic process of the inflation rate only considers the own volatility of the inflation rate, and fails to take into account the covariance structure between inflation rate and macroeconomic factors. Therefore, the main purpose of this paper is to fill the gap by using “multiple regression models” to develop a dynamic process of the consumer price index with the relationship of inflation rate and macroeconomic factors. This process can capture the short-term and long-term changes of the inflation rate, and also satisfies the “Fisher hypothesis” and the “New Keynesian Phillips hypothesis”. Moreover, the closed-form formulas of inflation-linked call options and inflation-linked caps in this framework are provided. Finally, the empirical and sensitive analyses investigate what and how the macroeconomic factors impact significantly the valuation of inflation index-linked derivatives.

Key words: Fisher hypothesis, New Keynesian Phillips hypothesis, Inflation-linked call options, Inflation-linked caps

## 目錄

摘要 .....	I
Abstract .....	II
致謝 .....	III
目錄 .....	IV
表目錄 .....	V
圖目錄 .....	VI
壹、研究動機與目的 .....	1
貳、文獻回顧 .....	5
第一節 通膨指數連結衍生性金融商品之發展 .....	5
第二節 通膨指數連結衍生性金融商品定價模型之發展 .....	8
參、模型方法 .....	10
第一節 假說 .....	10
(一) 費雪假說 .....	10
(二) 新凱恩斯學派 (New Keynesian) .....	10
第二節 通貨膨脹和總體經濟因子之動態過程 .....	12
第三節 通膨指數連結商品之報酬型式 .....	16
(一) 通膨指數連結買權 .....	16
(二) 通膨指數連結之上限買權 .....	17
肆、實證分析與敏感度分析 .....	20
第一節 資料描述 .....	20
第二節 實證結果分析 .....	22
第三節 敏感度分析 .....	24
伍、結論 .....	29
參考文獻 .....	30
附錄 .....	33
附錄一：測度轉換 .....	33
附錄二：通膨指數連結買權的推導 .....	39
附錄三：通膨指數連結上限買權的推導 .....	47

## 參考文獻

1. Ball, L., Mankiw, N.G., and Romer, D. (1988). The New Keynesian Economics and the Output-Inflation Trade-off, *Brooking Papers on Economic Activity*, 19, 1-65.
2. Belgrade, N., Benhamou, E., and Köhler, E. (2004). A Market Model for Inflation, working paper.
3. Calvo, G., (1983). Staggered Prices in a Utility Maximising Framework, *Journal of Monetary Economics*, 12(3), 383-398.
4. Ciurilă, N., and Murarușu B., (2008). Inflation Dynamics in Romania-A New Keynesian Perspective, *European Research Studies Journal*, 36, 155-160.
5. Deacon, M., Derry, A., and Mirfendereski, D., (2004). *Inflation-Indexed Securities, Bonds, Swaps and other Derivatives*, Wiley-Finance.
6. Fisher, I., (1922). *The Purchasing Power of Money*, New York, Macmillan, 208.
7. Gali, J., and Gertler M., (1999). Inflation Dynamics: A Structural Econometric Analysis, *Journal of Monetary Economics*, 44, 195-222.
8. Gali, J., Gertler, M. and Lopez-Salido J.D., (2005). Robustness of the estimates of the hybrid New Keynesian Phillips curve, *Journal of Monetary Economics*, 52, 1107-1118.
9. Gwin, C.R., and VanHoose D. D., (2007). Alternative Measures of Marginal Cost and Inflation in Estimations of New Keynesian Inflation Dynamics, *Journal of Macroeconomics*, 30, 928-940.
10. Hughston, L. P., (1998). *Inflation Derivatives*, working paper.

11. Hughston, L. P., and Macrina, A.,(2007). Information, Inflation, and Interest, working paper.
12. Jevons, W.S., (1875). Money and the Mechanism of Exchange, New York, Appleton.
13. Jarrow, R., and Yildirim, Y., (2003). Pricing Treasury Inflation Protected Securities and Related Derivatives Using an HJM Model, Journal of Financial and Quantitative Analysis, 38, 409-430.
14. Kazziha, S., (1999). Interest Rate Models, Inflation-based Derivatives, Trigger Notes and Cross-Currency Swaptions, PhD Thesis, Imperial College of Science, Technology and Medicine, London.
15. Korn, R., and Kruse, S., (2004). A Simple Model to Value Inflation-Linked Financial Products, (in German), Blatter der DGVM, XXVI (3), 351-367.
16. Kruse, S., and Nögel, U., (2005). On the Pricing of Forward Starting Options in Heston's Model on Stochastic Volatility, Finance and Stochastics, 9, 233-250.
17. Kruse, S., (2009). On the Pricing of Inflation-Indexed Caps, working paper.
18. Merton, R., (1976). Option Pricing when Underlying Stock Returns are Discontinuous, Journal of Financial Economics, 63, 3–50.
19. Mercurio, F., and Moreni, N., (2006). Inflation-Indexed Securities-Inflation with a Smile, Risk, 19(3), 70-75.
20. Matheson, T., (2008). Phillips Curve Forecasting in a Small Open Economy, Economics Letters, 98, 161-166.
21. Stock, J., and Watson M., (1999). Forecasting Inflation, Journal of Monetary

Economics, 44, 293-335.

22. Taylor, J.B., (1980). Aggregate Dynamics and Staggered Contracts, Journal of Political Economy, 88, 1-23.

