機車持有期間、報廢車齡與影響因子：存活分析之研究

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摘要

車輛持有之時間變數如持有期間與報廢車齡，對於研擬運輸規劃、運輸管理、環境保護，甚至交通安全改善等策略至為重要，國外多數有關車輛期間變數之研究係針對汽車，探討機車者十分罕見。基於機車在許多亞洲國家呈現高持有與使用之現象，以及部分歐洲國家機車持有與使用近來有增加趨勢，探討機車期間變數具有研究上之重要意義。近年來國內研究社群逐漸重視機車持有之時間變量研究，但在研究設計、資料蒐集與分析方法上均存在諸多缺失，以致限制相關研究之可能應用性，其主因仍在於欲以縱斷面研究方法建立有效之期間變數，存在觀測時間長與成本高等困難度。

本研究期透過交通部統計處於民國 89 年所蒐集大規模機車使用狀況調查樣本，結合監理資料車籍登錄系統，以逾 4 年的時間追蹤所蒐集樣本之車籍異動狀態，確認三類期間變數，包括特定機車車主之持有時間、機車報廢車輛及車主購買二手車之購車車齡等，建立不同期間變數與車輛特性、機車使用、縣市總體經社與污染排放變數之關聯性。此外，國內部分機車之車籍登記資料可能存在不正確的現象，依據交通部統計處調查資料顯示，至少有 11.8%的樣本已廢棄但並未完成報廢程序，顯示於本研究觀察期間中，部分尚未發生報廢或車主異動（轉手）等事件之設限資料，可能發生持有期間或車齡過度延長的現象，因此分析方法除採用常見之存活模式（或稱期間模式）外，特別引入分群期間模式進行修正，以提昇模式校估結果之正確性，並推估車籍登記資料中時間過度延長之比例。

研究結果顯示，車主若持有中古車、持有汽缸容量較小之機車、使用上有較

高之行駛里程與維修成本，以及家戶中汽車與機車數量越少，均會降低所觀察機車之持有時間與報廢車齡；反之，車主年齡越大、所得較低，以及車籍登記在大台北地區則會延長機車之持有時間與報廢車齡。此外，縣市總體經社變數中，較高的地區失業率及較低的地區消費傾向，對於地區內機車之平均持有時間與報廢車齡均有延長的效果，而較佳之地區機車定檢排放績效，則有縮短機車報廢車齡之傾向。

透過分群期間模式之推估，機車持有時間變量中，約有 21%的樣本之登記時間可能存在過度延長，機車報廢車齡變量之過度延長則約有 47%的樣本，顯示未完成登錄之車籍資料比例甚高。研究最後對於與機車期間變數相關的顯著貢獻因子，提出可能的解釋與推論，並對本研究設計與模式應用之限制進行討論。本研究之結果對於加速老舊機車汰換、改善排氣定檢制度及車籍登錄系統等議題，具有重要之意涵。

關鍵詞：機車、持有期間、報廢車齡、存活分析、分群期間模式。

Motorcycle Holding Duration, Scrappage Age, and Determinants: A Survival Analysis

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ABSTRACT

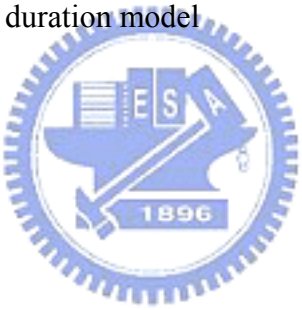
Vehicle duration variables such as holding duration and scrappage age are crucial for transportation planning and management, environmental protection, and traffic safety improvements. Most studies on vehicle duration have been focused on automobiles, but comparatively little has been noted on motorcycles. However, it is valuable to put much emphasis on motorcycle duration studies due to the high ownership rate for many Asian countries and also the ownership increase in some European countries.

Some weaknesses in research design and methodology for the previous motorcycle duration studies have been identified. These drawbacks originate mainly from the difficulties and elevated cost in establishing qualified duration data. In this study, a combination of the MOTC's sampling survey on motorcycle usage in 2000 with the corresponding registration information in the Vehicle Registration System (VRS) was developed. Via a four-more-years observation period, three different measurements for duration variables ─ motorcycle holding duration, scrappage age, and age of second-hand motorcycles purchased ─ can be observed. A Cox regression model was applied and two competing risks for ending motorcycle holding by disposal or by transfer were also estimated. However, around 11.8% of the samples have been discarded but not been registered in the VRS at the observation start. To reduce the bias from part of these censored data, we further applied a split-population duration model to correct the heterogeneity of holding duration and scrappage age.

The results indicated that a used motorcycle purchased, lower engine size, higher running mileage and maintenance cost, less motorcycle and less car fleet size in a

household reduced both the holding duration and scrappage age; but in contrast, older owners, less monthly income, and a motorcycle registered in Greater Taipei extended the holding duration and scrappage age. Aggregate socioeconomic predictors such as higher unemployment rate and lower consumption propensity also increased the holding time and overall life span of district's motorcycles. In addition, better emissions inspection performance of a district shortened the age of motorcycles being scrapped. The estimated split-population parameter showed that around 21% of observations for the holding duration and 47% for the scrappage age from the registration records had been prolonged censoring at the end of observation. Some policy implications connected with old motorcycles, emissions inspection, and vehicle registration system were raised and limitations about research design and modeling issues were also discussed.

Keywords: Motorcycle, scrappage age, holding duration, survival analysis, split-population duration model



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