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從日本經驗看高房價對經濟成長、國民消費及少子化之影響

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中文摘要：近年來，各已開發國家持續出現經濟成長減緩、薪資成長停滯與消費需求持續低迷之情形，屢有是否會陷入通貨緊縮之探討。日本自1990年代泡沫破裂以來，陷入「失落的十年」，在此二十多年間，房價暴跌、國民消費持續低迷與低生育之情形，相當值得作為已開發國家之借鏡。過去已有相當文獻針對低生育與低消費之成因與對策進行分析，本文以新家庭經濟學理論為核心，將其綜合進行討論，探研究生育、購屋與消費支出之相互關聯。本文以時間序列進行分析，探究日本1996年至2013年房價變動、消費支出與生育率之相互關係。實證結果發現生育行為與消費支出存在負向關聯，顯示家戶在預算有限之情形下，二者產生排擠效果。而生育行為與購屋行為則呈現同向變動關係，推測係自泡沫破裂以來，房價之變動回歸家戶之基本需求。此外，本文發現房價變動與消費支出亦存在相互排擠效果，過去文獻所認為之財富效果並未有其驗證，此結果可能受到各國相關抵押貸款制度、房價可負擔性之影響。此研究結論提供另一觀點探討低生育與低消費之成因，期望可對政策制定提供方向，更作為各已開發國家之前車之鑑。

中文關鍵詞：日本、平成蕭條、通貨緊縮、房價、家戶消費支出、生育率

英文摘要：In the last two decades, Japan has fallen in the economic recession after the burst of real estate bubble. Many studies focused on the causes of “Japan’s lost decades”. Some suggest that household consumption is the primary cause of the prolonged slowdown of economy in Japan. Becker (1960) proposed the “New Family Economy Theory” which treated children as normal goods and suggested that decision making of giving birth depended on the parents’ opportunity cost. On the other hand, real estate is an important asset for households’ wealth. Many studies found that fluctuation of housing prices would change the decision making of the household, especially the consumption and giving birth. The aim of this study is explore the impact of changes in housing prices on households’ consumption and fertility rate. This paper assumes that the crowding-out effect existed between the housing prices, households’ expenditure and the fertility rate. This study intends to analyze how the housing prices impact household consumer spending and fertility rate through the time series analysis in Japan from 1996 to 2013. Results of this study indicate that there is a negative effect of housing prices on household consumer spending. This study highlights the important relationship between the fluctuation of housing prices and the decision making of household, providing governments precious references on economic and demographic policies.

英文關鍵詞：Japan, Heisei recession, deflation, housing price,

household expenditure, fertility rate

# 科技部 MOST 104-2410-H-004-197

## 從日本經驗看高房價對國民消費與少子化之影響\*

林左裕\*\*、吳承擘\*\*\*

### 摘要

近年來，各已開發國家持續出現經濟成長減緩、薪資成長停滯與消費需求持續低迷之情形，屢有是否會陷入通貨緊縮之探討。日本自 1990 年代泡沫破裂以來，陷入「失落的十年」，在此二十多年間，房價暴跌、國民消費持續低迷與低生育之情形，相當值得作為已開發國家之借鏡。過去已有相當文獻針對低生育與低消費之成因與對策進行分析，本文以新家庭經濟學理論為核心，將其綜合進行討論，探研究生育、購屋與消費支出之相互關聯。

本文以時間序列進行分析，探究日本 1996 年至 2013 年房價變動、消費支出與生育率之相互關係。實證結果發現生育行為與消費支出存在負向關聯，顯示家戶在預算有限之情形下，二者產生排擠效果。而生育行為與購屋行為則呈現同向變動關係，推測係自泡沫破裂以來，房價之變動回歸家戶之基本需求與**動機刺激效果大於資源排擠效果所致**。此外，本文發現房價變動與消費支出亦存在相互排擠效果，過去文獻所認為之財富效果並未有其驗證，此結果可能受到各國相關抵押貸款制度、房價可負擔性之影響。此研究結論提供另一觀點探討低生育與低消費之成因，期望可對政策制定提供方向，作為各已開發國家之前車之鑑。

關鍵詞：日本、平成蕭條、通貨緊縮、房價、家戶消費支出、生育率

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## 一、前言

近年來，有鑑於世界性的低成長(包含低經濟成長率、低通貨膨脹率、低消費者物價指數年增率)，經濟學人雜誌持續對世界性的通貨緊縮危機提出警告。所謂通貨緊縮，就貨幣觀點而言，係指物價因貨幣數量減少或貨幣流通速度減緩，使貨幣之流通量相對減少，導致物價長期下跌、貨幣購買力上升之現象。在物價下跌之表徵之下，隨之而來的是消費者延遲消費、企業存貨增加而獲利衰退、失業率上升、財政困難、資產價格下跌、銀行逾放增加、資金外流及匯率貶值等現象。

提到通貨緊縮，日本可說是過去相當典型的實例。1980 年代，為因應廣場協議所帶來的日圓升值，日本央行為解決出口產業的衰退，以低利率的寬鬆貨幣政策因應，加上銀行傾向於向進行不動產融資，使得日本國內興起投機熱潮，尤其以不動產市場與股票交易市場最為明顯，受到「土地不會貶值」神話的影響，以投資轉賣的土地交易量增加，地價開始上升，加上銀行以不斷升值的土地作為擔保，向債務人大量放款，加速了房地產泡沫的形成。如圖 1 所示，東證房價指數自 1993 年以來持續下跌，至 2001 年為止下跌達一半之多，其後至 2014 年為止呈現平緩之勢。不動產價格下跌亦導致資產大幅縮水，金融機構背上大量不良債權，使其幾近癱瘓，企業亦因金融機構癱瘓影響而大量倒閉，連帶造成失業率上升、打擊國民消費信心，消費信心的下降造成國內需求不足，造成企業收益下降，更加劇裁員與減薪，成為一個惡性循環，國民經濟遭受重創，步入了戰後最長的「平成蕭條」與「失落的十年」(lost decade)時期。

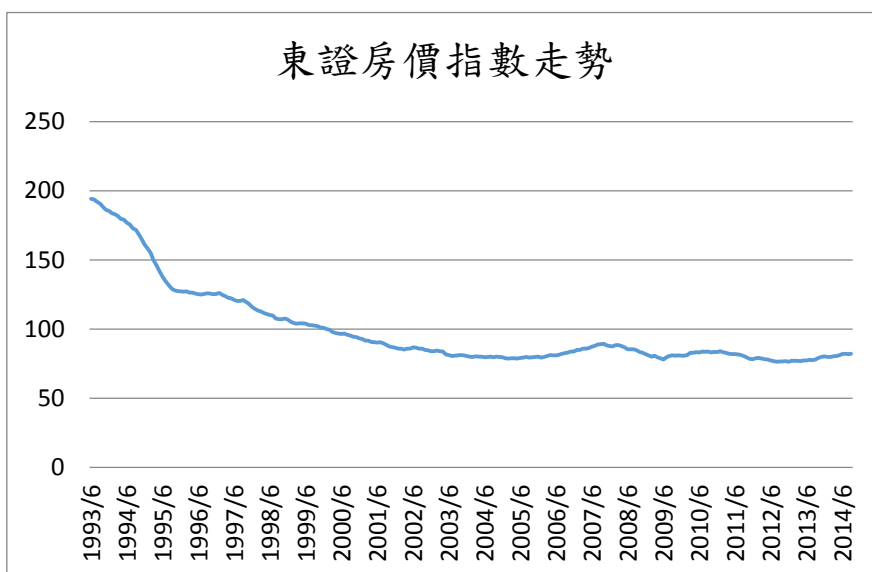


圖 1 東證房價指數走勢  
資料來源：日本國土交通省

針對日本失落的十年之成因，已有諸多文獻指出資產價格的縮水(包含土地與建物)是造成經濟衰退的主要原因之一。不動產業常被視為火車頭產業，亦即不動產市場領先景氣循環指標，也因不動產價格高昂，占家庭總財富大量的比例，在經濟成長與刺激消費上也占了很大的比例。此外，家戶消費的低迷，亦為其通貨緊縮之原因之一。如下圖 2 所示，民間消費支出自 1997 年以來均呈現平穩趨勢，2008 年因金融海嘯而劇烈下跌，2012 年安倍晉三首相為挽救頹靡經濟情勢，推出「安倍三箭」政策(分別為寬鬆貨幣政策、擴大財政支出、結構性經濟改革與成長策略)，消費支出在 2012 年第四季開始有顯著上漲，惟其後又呈現停滯，顯示政策僅在短期內有稍有成效。Horioka(2006)分析造成日本家戶消費停滯的理由，指出家戶消費可能受以下條件所影響：分別是家戶可支配所得、家戶財富、對未來的不確定性等，其更指出在 1991 至 2003 年間，因土地與資產價格的快速下跌導致家戶財富下降，可能為家戶消費停滯的主因之一。

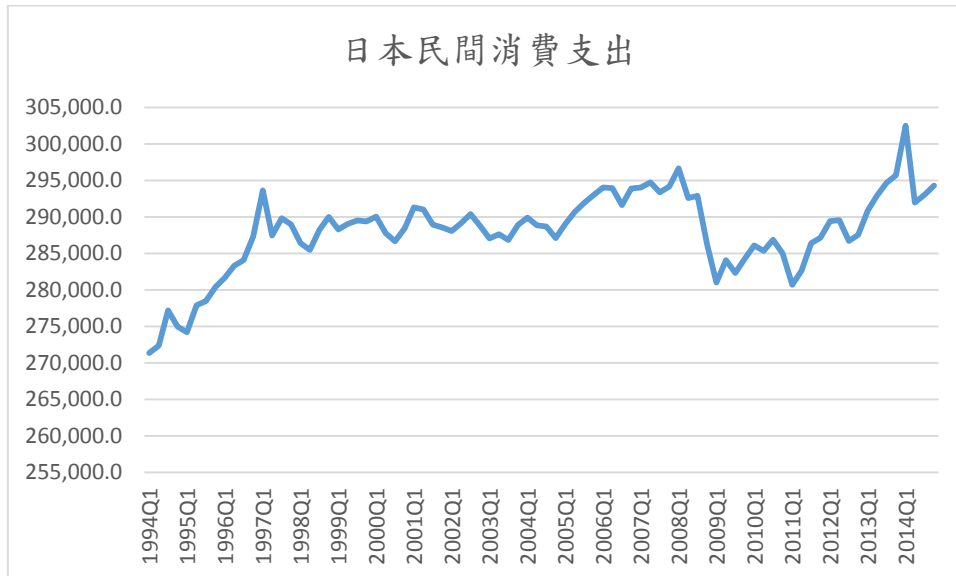


圖 2 日本民間消費支出走勢  
資料來源：TEJ(台灣經濟新報資料庫)

除了近期世界性的通貨緊縮危機外，過去二十年間，人口成長停滯與快速老化，已成為已開發國家當前最重要的課題之一。在日本，出生率的逐年下降、老年人口逐年上升，造成勞動人口亦逐年下降。如圖 3 所示，自 1983 年以來，生育率一路下降，至 2004 年稍有反轉，惟仍屬低生育國家。少子化現象的蔓延也引起許多討論，有些學者從人口學理上提出「低生育率陷阱」(Low-fertility trap)的警告：若低生率持續段很長的時間，在社會自我強化的機制下，將會形成惡性循環，不斷造成後續生育率下滑，倘若不藉外力干擾，必然深陷泥沼加劇惡化 (Lutz and Skirbekk, 2005)。

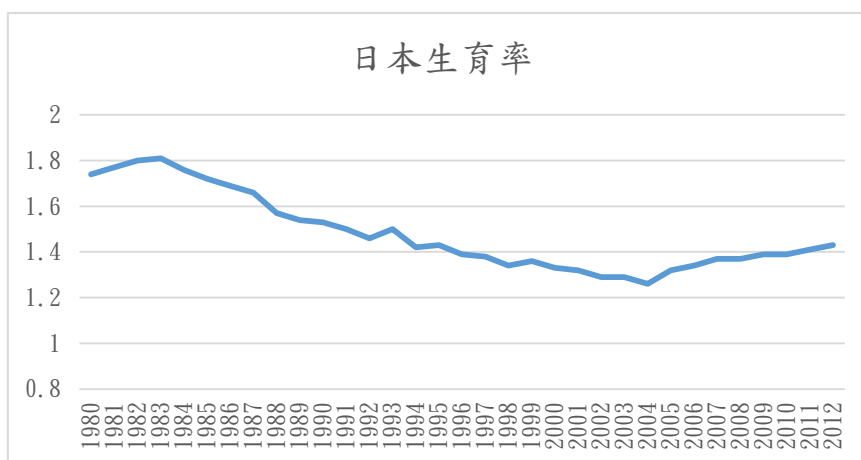


圖 3 日本生育率走勢  
資料來源：日本厚生勞動省

針對生育率下降之成因，已有諸多研究嘗試從不同面向進行探討，如從文化與社會、社會經濟結構、教育程度、女性勞動參與情形等觀點進行之分析。就經濟理論觀點視之，經濟成長與生育率有十分重要的連結。近來已有許多學者指出不動產市場的變動為檢視近年低生育率現象非常重要的觀點（Krishnan and Krotki, 1993；Mulder, 2006；Mulder and Billari, 2010；Yi and Zhang, 2010）。以家戶角度觀之，在家庭選擇上，生育與購屋具有替代性，Becker(1960)提出家庭經濟學理論，說明父母在面臨生育決策時，會考慮到家戶收入、養育成本或基於機會成本的考量，做出理性決策。一般而言，高收入代表的是在生育選擇上有較高的機會成本，如 Jones 等人(2008)研究發現在大多數的國家，生育率與收入呈現負相關的關係。

根據以上討論，在新家庭經濟學之理論背景與過去之實證分析下，房價變動可能為影響家戶在進行消費與生育決策時之重要考量因素，本研究除將以此作為理論基礎外，並嘗試將房價、消費與生育三項行為結合，探討其相互變動與影響關係。為了解在通貨緊縮背景下之互動關係，將以日本 1990 年代泡沫破滅後之「平成蕭條」時期作為研究背景，期望藉此了解此三項因素之相互變動關係，除探討影響生育之各項因素外，並對提振消費、促進經濟等政策做出建議。在臺灣可能即將來臨之通貨緊縮危機，提早做出因應，作為政府施政參考之依據。



## 二、文獻回顧

### (一)房價與消費支出之關聯性

過去已有針對金融資產與消費行為的研究，大部分呈現正向且顯著的關聯，針對這些關聯性，多是以「財富效果」解釋之。有關股票市場與消費支出之關聯性，如 Poterba(2000)指出股價上漲確實使消費支出增加。近來國外則有許多研究針對房價與消費支出之關聯性進行探討(Ludwig and Slok, 2002; ; Morris, 2006; Campbell and Cocco, 2007; Mian and Sufi, 2009; Christopher et al., 2010; Smith, 2010; Cooper, 2010; Case et al., 2013)，其卻各有不同研究結論與影響方式，茲分析如下。

當房價上漲，屋主之財富增加，可藉由售出房屋得到資本利得，帶來財富效果，進而增加其消費支出；或屋主並未售出房屋，但預期的資本利得依然使其產生財富效果，亦會增加其消費支出。相關實證如 Simth(2010)研究 1984 至 2007 年之間紐西蘭房價與消費之情況，指出房價的上漲會使屋主基於財富效果而增加消費，儘管資本利得尚未實現，但房價上漲會使屋主心理預期會有更多的財富，增加他們的支出水平。亦有研究同時將股票市場與不動產市場的變化與家戶的消費變動關係進行研究。又如 Case et al.(2013)以美國 1975 年至 2012 第二季進行實證分析，指出住宅市場與金融市場的上漲對消費支出皆有顯著正向的影響，且住宅市場的財富效果大於金融市場的財富效果。

國內研究方面，李美杏等人(2015)分析亞洲六個地區(臺灣、新加坡、韓國、日本、香港、上海)在 1995 第三季至 2014 第四季房價的財富效果，其使用 PMG(pooled mean group)捕捉長期與短期不同的變動關係，研究結果指出股價有明顯的財富效果，而房價在長期與短期的關係中皆不顯著，說明其並不會帶來財富效果。進一步分析各地區股市與房價的變動對消費所帶來的影響，發現臺灣、新加坡與韓國在短期皆有顯著的房價財富效果。然而，林佑倫(2015)以向量自我迴歸模型與衝擊反應函數分析臺灣房價對經濟成長與消費支出之影響，並以費雪方程式為理論基礎，卻產生不同的分析結果。發現落後一期的房價上漲會對當期

的消費支出產生負向影響，而落後一期的股市上漲對當期的消費支出則是有正向影響。研究結果指出臺灣存在股市的財富效果，而上漲的房價使得人們必須增加儲蓄、減少消費與投資，進一步可能造成經濟成長的衰退，顯示房價的上漲對消費支出產生排擠效果。

房價的上漲除了藉由已實現或預期的資本利得增加消費支出外，亦可解除屋主的信貸約束，使其可藉由再融資(refinance)等方式降低其流動性約束。Case et al.(2013)指出由於制度的變革(房貸二胎、再融資等)，房屋的財富效果變得尤其重要。相關實證如 Attanasio et al.(2009)研究指出房價上漲可增加屋主財富及其消費，並增加住房的抵押貸款且能減少其信貸約束。Glenn et al.(2002)研究發現使用住房再融資者，其中 35% 的資金用於住房改善、26% 資金用於支付其他債務、16% 資金用於其他消費支出、10% 資金用於不動產或商業投資、11% 用於股市投資、2% 用於繳稅。Haurin and Rosenthal(2006)當每單位美元的房價上升，家戶會將其中 15 美分用於承擔債務，並增加其消費支出。顯見房價上升使住房的再融資對消費支出亦有其影響。

然而，房價的上漲並非對所有人皆有其受益。於非自住承租人而言，若其收入維持不變，上漲的房價將會增加其租屋負擔，進而對消費支出產生負面影響。Li and Yao(2007)指出房價的財富效果會對不同的群體產生不同的財富效果，其以美國進行實證分析，依年齡與地區將屋主分類為不同群體，實證結果指出房價的上漲將對年逾 65 歲的屋主產生財富效果；然而對年輕屋主而言，可能會增加其住房消費，房價上漲所帶來的利得無法彌補其在未來所增加的住宅消費。而對租屋者而言，無法得到任何房價上漲的利益，僅會增加其住房支出。綜言之，房價的上漲僅對老年屋主有正向財富效果，而對年輕屋主與承租人而言，反而為負向影響。此外，房價的上漲於為了購置房屋年輕人或承租人而言，必須增加其儲蓄，進而對消費產生負面影響。

## (二)生育行為相關理論與文獻

### 1.影響生育行為相關因素

生育行為設籍人口、社會、經濟與文化等眾多不同面向，其理論基礎隨著時代的演進亦有所改變。觀察近期相關文獻可發現，多從社會經濟結構變遷等角度切入，部分則由文化社會思惟角度切入。社會經濟結構方面，主要可分為總體經濟因素與女性因素。總體經濟因素方面，過往文獻指出國內生產毛額、家庭收入、失業率、擁屋率、房價所得比等與生育率皆有顯著關聯(Schultz, 2001; Jones et al, 2008; Bar and Leukhina, 2010)。此外，Becker(1991)認為女性負擔大多數的子女照顧責任，女性工資與女性勞動參與率的提高將使得照顧子女的機會成本提高，進而降低生育率。諸多文獻亦將女性因素納入模型變數中進行分析，當中發現女性工資、女性勞動參與率、女性教育程度對生育行為皆有顯著影響(Becker, 1991; 李美慧, 2008)。

### 2.新家庭經濟學理論

從經濟觀點視之，Becker(1960)提出新家庭經濟學理論，改變對生育決策的思維，將子女包含在家庭的效用函數上，即是以傳統商品角度視之，使用消費選擇理論說明家庭對子女的需求，該理論認為子女少有替代品，因此當家庭收入或財富增加時，生育率應提升。此外，家庭受到預算之限制，依此可進一步推導最適子女數量與其他商品數量。該理論更認為養育子女的總成本應包含其影子價格，即父母的勞動機會成本。其後，Barro and Becker(1989)將子女視為耐久財，其認為子女與大多數財貨一樣，將替父母帶來效用，因此生育行為為父母的一種消費行為，父母將透過理性分析做出最適生育選擇。依此架構下，Becker(1991)進一步修正模型，將子女的質量納入效用函數做延伸討論，子女數量與質量皆受到子女影子價格的影響，二者間相互替代，即著名的質量互抵(trade-off)關係之理論(黃虹荏, 2016)。

近來已有許多針對新家庭經濟理論之實證分析，依據 Becker(1960)之見解，子女被視為一種正常財，然而其後的研究卻發現收入愈高或在所得愈高的國家，

生育率反而愈低(Bar and Leukhina, 2010)。Willis(1973)研究所得與生育率之間的關係，發現較高的工資率會提高女性生育另一個子女的機會成本，此機會成本的提高將降低擁有另一個子女的可能性。亦已有實證研究指出女性收入與生育率存在負向關聯(Heckman and Walker, 1990)。綜合過去文獻以簡言之，男性工資率對生育存在所得效果；而女性的工資率對生育則存在替代效果。

### 3.房價與生育率之關聯性

新家庭經濟學的觀點旨在強調生育決策取決於其機會成本。由前文獻回顧可得知，過去針對生育機會成本的相關研究多著重在女性之時間價值與機會成本(如女性參與勞動情形的增加、女性工資率的提升)。然而，若僅以人口變遷或社會結構改變之因素探討生育現象的改變，可能忽略其他因素造成分析上的偏誤。住宅被視為家庭的必需品，且為大部分家庭最重要的資產之一。在房價的攀升之下，購屋負擔或房屋貸款負擔加重，超過家戶所得所能負擔的範圍，在理性決策下可能會排擠生育現象。近來已有許多研究指出不動產市場的變動為檢視家戶生育現象的重要觀點(Krishnan and Krotki, 1993; Mulder, 2006; Mulder and Billari, 2010; Yi and Zhang, 2010)。以下就房價與生育行為相關研究之文獻進行整理。

近來因已開發國家低生育情況，相關研究轉向生育率與房價變動之關聯性。如 Kohler et. al(2002)認為房屋可及性是造成歐洲超低生育率的原因之一。Hui(2012)檢視香港生育率、房價與扶老比之間的關係，結果顯示房價的上漲會使得生育率下降。Simon et. al(2009)研究美國 1940 年至 2000 年普查資料探討房屋使用價格(租金)與生育率的關係，實證結果顯示住宅使用價格的上升對家戶生育決策有顯著的負向影響。上述的實證結果多是支持房價與生育之間的排擠效果，亦有研究指出當中可能存在財富效果，亦即房價的上漲可能會使得擁有自住房屋之屋主產生預期心理進而增加生育。Dettling and Kearney(2014)將美國都會地區的人口分為擁有自有房屋的人與無自有房屋的人，實證結果顯示當房價上漲 10% 時，擁有自住房屋者會增加 4.5% 的生育率；而會讓無自住房屋者降低 1% 的生育率。

上述相關研究將房價因素納入經濟模型當中，探討生育率與房價之關係。按

新家庭經濟學理論，其將子女視為正常財，因此房價上漲所造成的購屋壓力與貸款壓力將壓迫父母的可支配所得，並對子女的需求產生排擠效果(即負向所得效果)，造成生育率因此下降。換言之，房價為養育子女的影子價格(機會成本)。

### (三)小結

回顧日本過去「失落的二十年」，自泡破破裂後，不動產價格驟跌、銀行呆帳暴增。家戶受到其財產價格下跌的影響，消費與投資持續不振(Horioka, 2006)。政府嘗試諸多政策，包含降低企業稅負、直接發放消費券或現金(如 1999 年小淵惠三首相推出「地域振興券」、2008 年麻生太郎推出「定額給付金」)，或央行透過貨幣政策手段(自 2001 年起展開量化寬鬆、2008 年金融海嘯後擴大 QE 規模，至 2012 年首相安倍晉三的「安倍經濟學」)，無不希望提振頹靡不振的經濟情勢，惟其成效依然相當有限。

Horioka(2006)認為家戶消費的低迷(尤其是固定的私人投資)是日本經濟不振的原因之一。根據以上分析，可得知影響家戶消費支出的原因眾多，如收入的變化、生育的決策、房價的變動等等。其中，新家庭經濟學理論嘗試從不同角度探討生育行為的影響因素，其認為父母會將子女視為正常財，納入效用函數進行分析，考量養育子女的影子價格(機會成本)後進行決策。回顧過去文獻，可發現房價與消費可能存在財富效果或排擠效果，房價與生育亦存在著正向或負向的關聯性。而在資源有限的情況下，按新家庭經濟學理論，家戶消費與生育亦應存在排擠效果，本研究將近一部討論消費與生育之變動關係。過去雖有研究從房價變動層面探討其對生育或消費的影響，卻較少將此三者之相互變動關係同時納入考量。有鑑於此，本文嘗試以新家庭經濟學角度為核心，探討房價、消費、生育三者間的相互關係，除分析影響生育之因素外，並對提振消費等政策提出建議。

### 三、研究方法與研究設計

#### (一)研究方法

研究係探討生育率、民間消費支出與房價指數、經濟成長率、利率、消費者物價指數與家戶可支配所得之間是否存在長期穩定均衡關係與短期間動態關係，及變數間是否存在「領先-落後」之關係，而由於時間序列變數存在單根及結構性轉變的可能，故為避免發生虛假迴歸使統計發生偏誤，在進行上述統計檢定前，需對資料進行結構轉變檢定與單根檢定，於確認資料屬性後，使用 Johansen 共整合檢定方法分析，檢定生育率、民間消費支出與房價指數、經濟成長率、利率、消費者物價指數與家戶可支配所得是否存在共整合關係，再使用向量自我回歸模型或向量誤差修正模型，使模型涵蓋不同時期變數以檢定短期動態關係，最後使用 Granger 因果關係檢定了解變數之間為「領先-落後」關係。

##### 1.結構性轉變檢定

進行單根檢定之前，需要確認時間序列變數在研究期間內是否有任何結構上的變化。本研究採用的時間序列數據，有可能在研究期間發生如戰爭、天災、政策或經濟發展等擾亂衝擊。如果分析期間有結構性變化，在此期間的單根檢定結果會有誤差。為了避免統計推論或預測發生問題，本研究利用 CUSUM (Cumulative Sum of the recursive residuals) 檢定來測試是否有結構性轉變 (Structural changes)。如果有結構性轉變，必須將研究時間再度切割至沒有結構性轉變為止，才能降低模型估計的錯誤。

##### 2.單根檢定

在實證研究時，一般總體時間序列資料多有非定態性質，非定態時間序列資料，將因外來任意的隨機衝擊，使資料的平均數、共變數與變異數隨時間改變而改變，而使時間序列資料無法收斂至原來的均衡狀態，當變數存在單根情況下，許多檢定統計量會失去其作用，故本文進行時間序列的統計分析前，為檢測資料是否存在單根，採用 Said and Dickey(1984)提出的 Augmented Dickey Fuller(ADF) 檢定法，檢定資料是否為定態。若檢定結果非定態，可進行共整合檢定或將變數

進行差分以估計變數的長短期均衡關係。

### 3.共整合檢定

儘管差分可解決資料非恆定的問題，但也容易使得變數間所存在的長期資訊不自覺中被消除，可能造成實證結果的誤差。因此，為了避免此種狀況發生，Granger(1981)，提出了共整合的構想，其意指雖然有些時間序列變數本身是非定態，但是它們的線性組合可能是定態序列，這就是所謂的「共整合」現象。本研究採用 Johansen(1988) 較有彈性且實際運用較廣以最大概似估計法的方式計算。

### 4.向量自我迴歸模型與向量誤差修正模型

向量自我迴歸模型(Vector Autoregression, VAR)係由 Sim(1980)提出，向量自我迴歸模型中將所有變數視為內生變數(endogenous variables)，每一個變數都可以自身的落後期與其他變數的落後期來表示。如此一來使得模型解釋涵蓋範圍擴大，進而能探討變數間之互動關係，避免模型認定(identification)的問題產生。而 VAR 方程式的殘差必須是無序列相關的白噪，因此最適延遲期數的選擇就是一個重要的命題，本研究將透過 AIC 與 SBIC 選擇最適期數進行分析。

而依據 Engle and Granger(1987)之研究，如果變數間存在共整合關係，則具有長期穩定均衡關係，且必定有誤差修正項。若於向量自我迴歸模型(Vector Autoregression, VAR)中加入誤差修正項，形成向量誤差修正模型(Vector Error Correction Model, VECM)，則能瞭解變數間的短期動態關係。

### 5.Granger 因果關係檢定

因果關係檢定，係 Granger(1969)提出，係指若兩時間序列存在因果關係，當增加一個獨立變數過去的資訊，可增加應變數的解釋能力並且減少預測誤差。即檢測一時間序列對另一時間序列是否具預測能力，透過因果關係之檢定將可以了解兩個變數之間之領先(lead)或落後(lag)之關係。然 Granger 之因果關係為統計上的領先與落後之關係，並非全然是總體經濟理論中的因果關係。

## (二)變數選取與資料說明

### 1.變數選取

表 1 各變數代號與資料來源說明

類別	變數	變數代號	資料來源	資料期間
應變數	民間消費支出	CS	TEJ(台灣經濟新報資料庫)	1996-2013
	生育率	FR	日本厚生勞動省	1996-2013
自變數	房價指數	HPI	日本國土交通省	1996-2013
	家戶可支配所得	INC	TEJ(台灣經濟新報資料庫)	1996-2013
	消費者物價指數	CPI	TEJ(台灣經濟新報資料庫)	1996-2013
	失業率	UR	TEJ(台灣經濟新報資料庫)	1996-2013
	利率	INT	TEJ(台灣經濟新報資料庫)	1996-2013

### 2.敘述性統計

表 2 各變數敘述性統計表

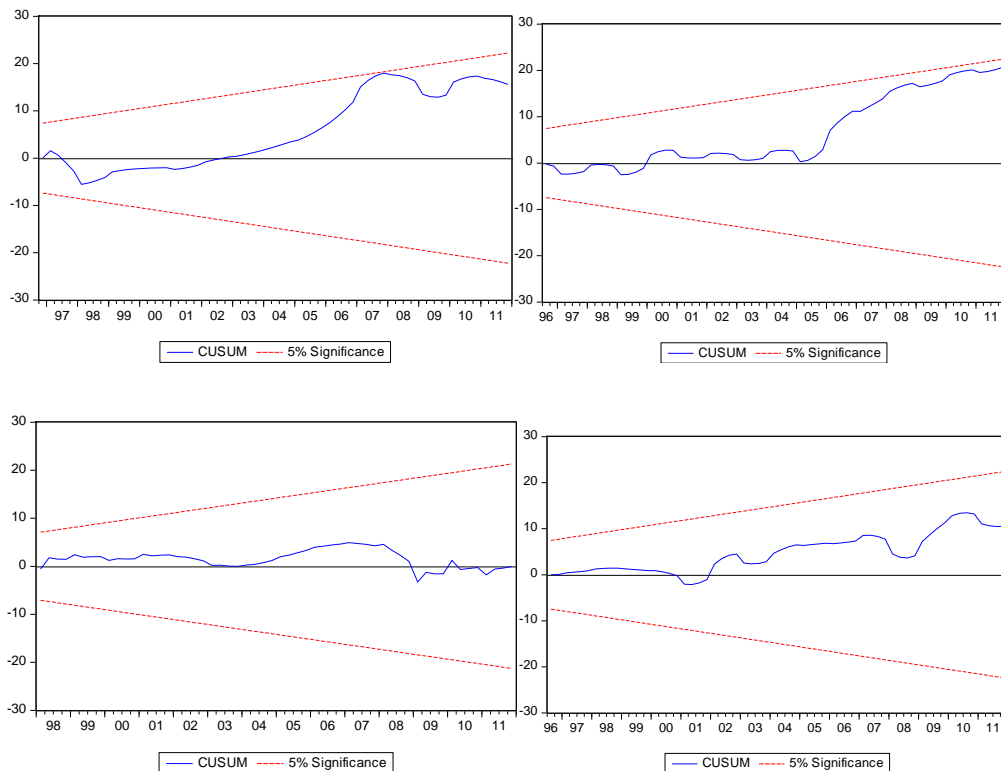
變數	平均數	中位數	最大值	最小值	標準差	樣本數
CS	288881	288922	294800	281787	3285.6	72
FR	1.356	1.363	1.434	1.255	0.048	72
HPI	90.475	83.758	129.474	77.055	14.690	72
INC(%)	67.38	77.84	263.27	-115.4	82.73	72
CPI	101.23	100.75	103.76	99.53	1.25	72
UR	4.45	4.50	5.38	3.28	0.59	72
INT	0.34	0.31	0.82	0.03	0.24	72



## 四、實證分析

### (一)結構性轉變檢定

結構性轉變為導致時間序列數列為非定態數列之原因之一，其可能來自於均值的變動、變異數的變動、或迴歸係數的變動，造成結構性轉變的原因可能為政策變動、制度上之轉變、或外生衝擊所導致。因此，為確定數列為定態性質，在分析前須先進行結構性轉變之測試。本研究原先設定研究期間為 1995 年至 2014 年，惟在進行檢定時發現東證房價指數與生育率發生結構性轉變，經調整研究期間為 1996 年至 2013 年後，選定變數在 5% 臨界值下均無結構性轉變之發生，可進行後續分析，分析結果如下圖所示。



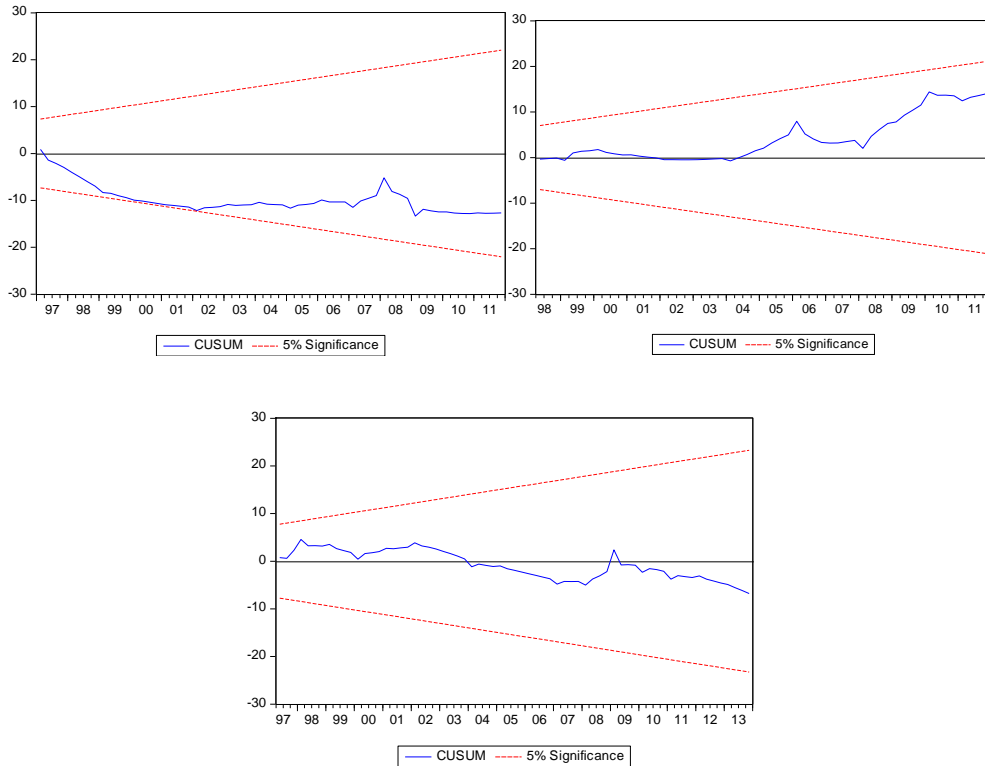


圖 4 結構性轉變檢定

## (二)單根檢定

除結構性轉變外，在進行分析前，為避免虛假迴歸之情況產生，需先以單根檢定測試變數是否為定態數列，若為非定態數列，則須先進行差分後才得進行後續分析。本研究以 ADF 與 PP 檢定進行分析，分析結果如表 3 示。由下表可得知，在 ADF 單根檢定中，所有變數在水準值皆無法拒絕有單根的虛無假設，顯示其可能有單根存在，在一階差分過後所有數列皆顯著拒絕有單根的虛無假設。在 PP 單根檢定中，僅有房價指數在水準值顯示定態，其餘變數亦需進行一階差分後才轉為定態。為維持變數在同一階次以利後續研究，本研究將所有變數進行一階差分後進行後續分析。

表 3 單根檢定

變數	ADF 單根檢定		PP 單根檢定	
	Level	1 <sup>st</sup> difference	Level	1 <sup>st</sup> difference
THPI	0.447	-2.153**	-3.310***	-3.225***
FR	0.364	-1.918*	-0.071	-4.751***
CS	0.248	-2.815***	0.836	-4.383***
INT	-0.585	-4.102***	-0.685	-4.240***
CPI	-0.388	-2.456**	-0.082	-3.579***
UR	-0.263	-3.254***	-0.008	-3.307***
INC	-1.295	-2.682***	-2.196**	-5.414***

### (三)共整合檢定

#### 1.最適落後期選擇

在進行共整合、VAR、VECM 與 Granger 因果關係檢定前，需先判定最適或落後期。本研究根據 AIC 與 SBC 法則進行測試。測試結果如下表，在第四期時 AIC 與 SBC 值皆為最小，因此選定第四期為本研究之落後期，進行後續分析。

表 4 最適落後期選擇

lag	AIC	SBC
1	4.527	6.326
2	6.076	7.890
3	6.725	8.553
4	0.838*	2.681*
5	6.524	8.382
6	6.859	8.733

#### 2.共整合檢定

在確定各變數之階次與最適落後期後，可藉由共整合檢定檢視變數間在長期是否存在均衡關係，若具有共整合關係，則以 VECM 進行短期變動之修正，若不具有共整合關係，則以 VAR 進行變數間變動關係之測試。

檢定結果如下表所示，對角元素和統計量結果顯示在 10% 的顯著水準下拒絕最多六個共整合向量的虛無假設，而最大特性根統計量結果則顯示拒絕無共整合向量的虛無假設。當此二者檢定結果不同時，Johansen and Juselius(1990)指出當特徵值分布較平均時，以對角元素和檢定之檢定力較強；反之，則為最大特性根檢定力較強。觀察本表特徵值，可發現特性根分布較平均，因此以對角元素和統計量為主，判斷變數間具有長期整合關係。換言之，民間消費支出、生育率、房價、消費者物價指數與利率等變數在長期趨勢下有均衡關係，會隨著此均衡關係而變動。

表 5 共整合檢定

虛無假設	特徵值	對角元素和 統計量	5% 臨界值	最大特性根 統計量	5% 臨界值
None	0.520	166.559	125.615***	48.466	46.231**
At most 1	0.380	118.093	95.754***	31.568	40.077
At most 2	0.324	86.525	69.819***	25.830	33.877
At most 3	0.298	60.964	47.856***	23.344	27.584
At most 4	0.260	37.250	29.797***	19.889	21.132*
At most 5	0.194	17.461	15.495**	14.243	14.265*
At most 6	0.048	3.218	3.841*	3.219	2.841*

#### (四) 向量誤差修正模型

由於變數間具有共整合關係，可確認其之間存在長期趨勢關係。然而，其在短期內可能有偏離長期趨勢的情形產生，因此可藉由向量誤差修正模型(VECM)捕捉其短期變動關係。

新家庭經濟學理論認為家戶在資源有限的情形下會進行理性決策，因此生育與購屋兩行為可能會產生排擠效果。由表 6 分析結果(因表格篇幅過大，僅列出顯著之變數)可得知，落後四期之生育率與房價呈現正向關聯，與上述理論概念相悖離。探究其原因，或許可由基本面觀之，顯示當家戶進行生育決策時，因安家或其他基本需求等原因，將提升其對房屋的需求，使房屋價格上升。以日本情況而言，自 1996 年生育率的持續下降至 2005 年轉折緩步上升，對房價可能產生基本面的變動影響。此外，落後四期之生育率與消費支出呈現負向關聯，此結果

與新家庭經濟學理論相符，認為當家戶進行生育決策時，考量養育子女所需付出之成本，將減少其消費支出。

觀察房價變動與消費支出之關聯性，分析結果可發現落後四期之消費支出與房價呈現正向關聯，顯示當消費支出的變動與房價呈現同向變動，且前者的變動領先後者。以日本情況而言，因通貨緊縮與房價持續下跌之關係，致家戶不願進行消費與購屋，致家戶對於消費與購屋之需求為同向變動。另一方面，落後四期之房價指數與消費支出呈現負向關聯，顯示購屋與消費支出之間並無財富效果產生，二者產生相互排擠的效果。此研究結果與 Carroll et al.(2006)、Case et al.(2013)以美國進行實證分析之結果不同，其認為房價與消費支出存在財富效果；而與林佑倫(2015)結果相同，其以臺灣進行實證分析，指出二者產生相互排擠之效應。顯示於日本情況而言，消費支出的低迷，其中原因可能為家戶購置房屋。換言之，當家戶進行購決策時，因排擠效果導致消費支出的減少。

此外，特別值得注意的是，落後四期之利率與房價指數呈現正向關聯，亦與消費支出呈現正向關聯。回顧日本近年貨幣政策，多以低利率與零利率為主，期望藉由貨幣政策的效果刺激民眾與企業進行投資或消費。利率的調降，於家戶而言，為其購置房屋的資金成本有其降低作用。於建商而言，亦為降低其融資成本。因此利率的調降對於不動產市場而言應為正向影響。另外，落後四期之利率與消費支出亦呈現正向關聯。前述的同向變動，應為整體通貨緊縮背景之下，民眾對整體大環境前景不看好，致貨幣政策成效有限，無法達到刺激不動產市場與消費的作用。落後四期之消費者物價指數與房價指數、生育率及消費支出皆呈現負向關聯。當消費者物價指數的下降，將會刺激民眾增加消費支出，對房價、生育率亦有正向影響。當整體通貨緊縮環境來臨時，最明顯的例子就是消費者物價指數之持平或下降，從房價與生育率觀點觀之，其反而可能有房價上漲之效果與生育率上升之助益。

表 6 向量誤差修正模型

	THPI	FR	CS	INC	CPI	INT	UR
Variables							
THPI(-1)	0.186	-0.001	176.039	-0.010	0.091*	-0.004	0.006
THPI(-2)	0.153	-0.001	157.598	-0.040	0.109**	-0.006	0.018
THPI(-3)	0.140	-0.001	156.056	-0.044	0.109**	-0.007	0.021
THPI(-4)	-0.062	-0.001	-602.3***	-0.240***	0.268***	-0.040***	-0.032
FR(-1)	2.455	0.376*	-13132.34	9.726	-11.932**	3.629***	0.366
FR(-2)	1.283	0.415**	-10042.37	7.586	-10.385**	3.369***	0.386
FR(-3)	1.699	0.420**	-8407.395	7.127	-9.557**	3.234***	0.303
FR(-4)	35.861**	-0.321*	-19895.6*	-2.036	-12.395***	1.178	-2.764
CS(-4)	<0.001***	<0.001	-0.226***	<0.001	<-0.001***	<0.001	<-0.001
INC(-1)	-0.203	0.004	-28.998	0.364	-0.233**	0.002	0.004
INC(-2)	-0.140	0.003	-31.404	0.442*	-0.265**	0.005	-0.002
INC(-3)	-0.140	0.003	-36.900	0.465**	-0.286***	0.007	-0.004
INC(-4)	-0.765**	-0.003	185.331	-0.126	-0.325***	0.039	0.087**
CPI(-4)	-2.772***	-0.015***	-4161.0***	0.747***	-0.580***	-0.025	0.465***
INT(-4)	8.678***	0.054**	9547.53***	2.682**	-0.585	0.421***	-0.558*
UR(-2)	1.505	0.004	1037.568	-0.707	0.956**	0.075	0.091
UR(-3)	1.353	0.003	974.394	-0.782	0.987**	0.067	0.129
UR(-4)	6.495***	0.018	-5526.1***	1.202	0.470	-0.036	-0.190

註 1：\*、\*\*和\*\*\*分別表示 10%、5%和 1%之顯著水準。

### (五)Granger 因果關係檢定

Granger 因果關係是在控制應變數本身落後項之情況下，若自變數之落後項對應變數有顯著影響，便稱「自變數會 Granger 影響應變數」。藉由此檢定可掌握當自變數變動時，是否得作為預測應變數之領先指標。由下表分析結果可得知，房價的變動單向影響生育率與可支配所得，並與消費者物價指數呈現雙向變動關係，顯示房價的變動得作為此些應變數之預測指標。而消費支出單向影響房價與可支配所得，消費者物價指數之變動除與房價有雙向因果關係外，亦單向影響消費支出與失業率。此外，利率的變動將影響房價的變動，以及失業率的變動可作為可支配所得與消費者物價指數的領先指標。

表 7 Granger 因果關係檢定

應變數	自變數						
	THPI	FR	CS	INC	CPI	INT	UR
THPI	--	1.822	2.302*	1.598	4.121***	2.568**	1.082
FR	5.925***	--	0.130	0.504	0.234	0.738	0.386
CS	0.326	0.070	--	0.990	3.846***	1.481	0.751
INC	2.786**	0.409	2.240*	--	0.285	0.533	5.177***
CPI	2.915**	0.329	0.916	0.511	--	1.658	2.466*
INT	0.552	1.424	0.673	0.300	1.352	--	0.375
UR	1.055	0.046	0.236	3.244**	10.302***	1.722	--

註 1：表中數字為卡方值。

註 2：\*、\*\*和\*\*\*分別表示 10%、5%和 1%之顯著水準。

## 五、討論

本研究以日本情況為例，探討家戶在受到房價變動之外生因素改變時，將如何影響其消費與生育行為。並可藉此討論影響日本過去「失落的二十年」之消費低迷之原因，探討房價變動在這當中所扮演之角色。此外，長期陷入低生育國家之日本，房價變動與消費變動是否亦是影響其生育決策的原因之一，亦為本研究欲探究之對象。有鑑於此，以 Becker(1960)之新家庭經濟學理論為基礎，除歸納整理過去相關研究，並同時將此三變數加入模型中進行實證分析，探討其相互變動關係。

根據 VECM 與 Granger 因果關係檢定分析結果發現，落後四期之生育率與房價呈現顯著正向關聯，此正向變動關係與過去以其他地區(如義大利、美國與香港)進行之實證研究皆不同。其分別發現房價(或房租)變動與生育率呈現負向的顯著關聯(Giannelli and Monfardini, 2003; Simon, 2009; Hui et. al, 2012)。購屋與生育行為皆來自於家戶對於住屋與子女的需求動機，二者皆隱含著高成本與低彈性之特性、難以替代，因此產生競爭關係(林佩萱, 2015)。然而，本研究以日本情形進行實證並未發現上述理論之驗證，進一步探究其原因，在 2005 年之前生育率皆持續下降，同一時期房價受到不動產泡沫破裂與對未來不看好情形的

影響，亦呈現持續下降的過程。自 2005 年以後，生育率觸底開始逐步回升，同時房價指數亦在此時下跌程度趨緩並在 2005 至 2007 年間稍有回升，顯示房價的變動自泡沫破裂後逐漸回歸基本面，其回升可能受到家戶基本需求的影響。此外，林佩萱(2015)進一步指出購屋及生育行為間可能同時存在資源排擠效果及動機刺激效果兩相反作用力，簡言之，兩行為任一事件的發生將有助於提高家庭穩定性，進而提高另一事件發生的機率。本研究認為除其變動逐漸回歸基本面外，可能亦為動機刺激效果大於資源排擠效果所致，使其呈現同向變動。

本研究另探討生育與消費之相互影響關係，根據 VECM 分析結果，落後四期之生育率與消費支出呈現負向關聯，顯示其之間存在相互排擠效果。此部分關係與上述房價與生育行為關聯性概念不同，雖然在資源有限之情形下，其之間可能存在資源排擠效果，然而卻無動機刺激效果。因此，以新家庭經濟學概念解釋之，當將子女加入家戶的效用函數，家戶基於資源有限、理性決策之分析，會在增加其消費與生育子女間進行決策，使其之間存在相互排擠效果。

除此之外，本研究另一研究重點為房價變動與消費支出關聯性之研究，即房價變動是否存在財富效果之探討。過去研究分別指出房價的上漲將透過各種不同的管道帶來財富效果，使民眾增加其消費，如 Edelstein and Lum(2004)以新加坡、Campbell and Cocco(2005)以英國、Case et. al(2013)以美國為實證地區進行分析，皆發現房價與消費支出存在正向關聯，且房價財富的邊際消費傾向更高於金融資產財富(Benjamin et. al, 2004; Case et. al, 2013)；另外，也有研究指出房價與消費存在負向關聯，房價的上漲將排擠消費支出，對於國內經濟並無助益，反而還因為民間消費的減少造成經濟成長的趨緩(林左裕等人，2013；林佑倫，2015)。本研究以日本進行實證分析對象，向量誤差修正模型分析結果顯示落後四期之房價指數與消費支出呈現負向關聯，兩者間存在排擠效果，與林左裕等人(2013)及林佑倫(2015)研究結論一致。然而，何以會有不同的影響關係呢？不同的研究方法或許會造成不同的分析結果，本研究將焦點放在不同實證地區所致，比較上述文獻可發現，存在財富效果之研究中(如美國與英國)，其住宅抵押貸款流動性較高、再融資等制度皆較日本與臺灣健全，屋主較容易利用房價的上漲取得額外資



金，因此房價的變動對屋主的影响程度較為直接，致其之間存在財富效果。觀察日本與臺灣情形，其相關制度皆無美國完善，住宅價格的上漲或下跌僅為紙上富貴，在利得實現之前屋主並未獲得較多的額外收入。此外，可能東方國家受到「有土斯有財」之傳統觀念影響，將購屋視為一重要目標。且當房價上漲程度已超過該國人民可支配範圍(如近年來的臺灣)，將迫使其增加存款、緊縮消費，僅為追上不斷上升的房價，致消費支出減少。綜上所述，本研究認為分析結果之不同可能受到各國相關制度的規範、房價與其人民可負擔的變動關係、與各國傳統觀念所影響。

## 六、結論與建議

近年來，已開發國家之經濟成長、薪資成長與消費需求持續低迷，引起諸多有關通貨緊縮的討論。回顧過去通貨緊縮之相關案例，日本自泡沫破裂以來之「失落的十年」，可為相當典型之例子。此外，日本自 1990 年代陷入低生育與高齡之人口結構，亦為其整體國家社會所面臨之重大議題。本研究以 Becker(1960)提出之新家庭經濟學理論作為理論基礎，其指出可將子女包含在家庭的效用函數上，即將其視為傳統商品，認為家戶在受到預算限制的情況下，父母將透過理性分析做出最適生育選擇。依據此概念，占家庭支出大宗之購屋、消費行為與生育三者，應存在相當影響關係。過去已有文獻針對消費支出與購屋、生育率與購屋之影響關係進行實證分析，然而卻鮮有文獻針對此三項議題同時進行探討。有鑑於此，本文嘗試將此三項議題合併進行分析，並以日本過去情形為例，期望藉由分析結果探討低生育與低消費之成因，並對此提出政策建議。

本文以探討 1996 年至 2013 年日本情形，以時間序列(包含共整合檢定、向量誤差修正模型與 Granger 因果關係檢定)進行分析。實證結果發現生育行為與消費支出呈現負向關聯，按新家庭經濟學理論之分析，顯示家戶在預算有限之情形下，二者產生排擠效果，若政府欲以各項經濟與財稅措施提振經濟刺激消費外，建議亦可增加生育之相關補貼與獎勵，避免消費與生育之相互排擠致政策成效受限。此外，生育行為與購屋行為呈現同向變動，新家庭經濟學理論在此並未有其驗證。顯示房價的變動自泡沫破滅後可能逐漸回歸基本面，或其動機刺激效果大

於資源排擠效果，因此購屋與生育的相互排擠現象在日本並未有其驗證。

本文另一研究議題為房價變動財富效果之驗證，過去亦有諸多研究指出房價的上漲將透過各種不同的管道帶來財富效果；日本房價的下跌是否會對其消費支出帶來減少之影響(即負向的財富效果)？本研究向量誤差修正模型分析結果顯示房價變動與消費支出呈現負向關聯，二者存在排擠效果，與林左裕等人(2014)與林佑倫(2015)研究結論一致。探究其原因，分析結果的不同可能受到各國相關制度的規範與人民可負擔房價的相對關係所影響，如以美國或英國為實證地區的研究，其住宅抵押貸款流動性較高、再融資等制度皆較日本與臺灣健全，屋主較容易利用房價的上漲取得額外資金，因此房價的變動對屋主的影響程度較為直接，致其之間存在財富效果，而臺灣與日本皆無。且當房價上漲程度已超過該國人民可支配範圍(如近年來的臺灣)，將迫使其增加存款、緊縮消費，僅為追上不斷上升的房價，致消費支出減少。

相較於過往其他研究，本研究提出另一觀點同時探討生育、消費與房價三者之相互變動關係，期望藉由本研究之綜合比較分析，提供另一觀點探究近年諸多已開發國家低生育與低消費之成因，並藉此了解房價在其變動當中所扮演的角色。於本國政府而言，除對此提供政策建議外，並以此為鑑防患於未然，做好準備以面臨即將來臨的低成長時代。

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**The Influence of Housing Prices on Household Expenditure and Fertility Rate ---  
Japan's Experience\***

Tsoyu Calvin Lin\*\*, Cheng-Yeh Wu\*\*\*

**Abstract**

In the last two decades, Japan has fallen in the economic recession after the burst of real estate bubble. Many studies focused on the causes of “Japan’s lost decades”. Some suggest that household consumption is the primary cause of the prolonged slowdown of economy in Japan. Becker (1960) proposed the “New Family Economy Theory” which treated children as normal goods and suggested that decision making of giving birth depended on the parents’ opportunity cost. On the other hand, real estate is an important asset for households’ wealth. Many studies found that fluctuation of housing prices would change the decision making of the household, especially the consumption and giving birth.

The aim of this study is explore the impact of changes in housing prices on households’ consumption and fertility rate. This paper assumes that the crowding-out effect existed between the housing prices, households’ expenditure and the fertility rate. This study intends to analyze how the housing prices impact household consumer spending and fertility rate through the time series analysis in Japan from 1996 to 2013. Results of this study indicate that there is a negative effect of housing prices on household consumer spending. This study highlights the important relationship between the fluctuation of housing prices and the decision making of household, providing governments precious references on economic and demographic policies.

Key words: Japan, Heisei recession, deflation, housing price, household expenditure, fertility rate

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# 1. Introduction

## (1) Background

According to the “Global Wage Report” published by International Labor Organization, wage growth has stagnated around the world in recently year. The only progress was contributed by emerging countries. Among them, China’s wage growth accounted for more than half of the global growth. After the global financial crisis in 2008 and then the European sovereign debt in 2010, most of the world’s major developed countries economics fell in recession. The Federal Reserve Board, European Central Bank and Japan’s central bank have been implementing easy monetary policy to revive the economy. Due to the low growth around the world (including low economic growth, low inflation and low CPI), “The Economists” magazine continued to warn the global deflationary crisis.

Deflation is the decrease in the general price level of goods and services (Barro and Grilli, 1994). Economists generally believe that deflation is a problem in a modern economy because it increases the real value of debt, and may aggravate recessions and lead to a deflationary spiral. (Hummel, 2007). Under the characterization of the drop in prices, followed by a delay consumer spending, business inventories increased profit recession, rising unemployment rate, financial difficulties, falling asset prices, bank overdue loans ratio increased, capital outflows and exchange rate depreciation. As for deflation, Japan is a typical example. In the 1980s, the yen continued to appreciate after the Plaza Accord,. To rescue the declining export, Bank of Japan implemented low interest rate and loose monetary policy. In addition, banks tend to provide financing to real estate industry, lead to the rise of speculative boom in Japan. The amount of land transactions aiming for capital gains increased and land prices begun to escalated. Banks’s lending continued to support the

real estate industry and assist the appreciation of land prices, which resulted in the formation of real estate bubble. As shown in the Figure 1, housing prices of Tokyo continued to decline since 1993, and fell by half until 2014. The decline of real estate prices led households' assets to shrink. Financial institutions hold large amounts of bad debt. The financing activities of enterprises were also affected by paralyzed financial institutions, leading to bankruptcy. Finally, the rise of unemployment rate and lack of consumer confidence led to the decline of corporate earnings and investment. The phenomenon then caused a vicious circle and entered the longest “Heisei recession” or “lost decade” after World War II.

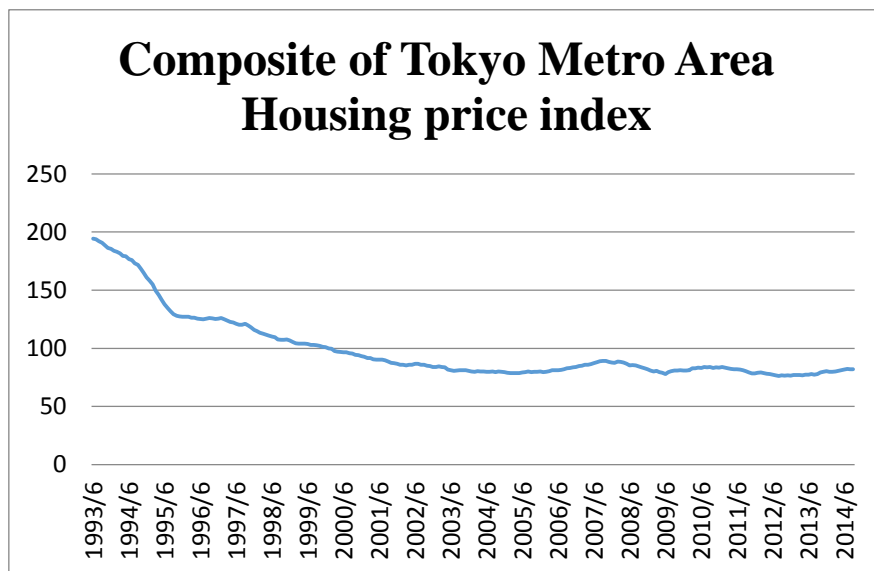
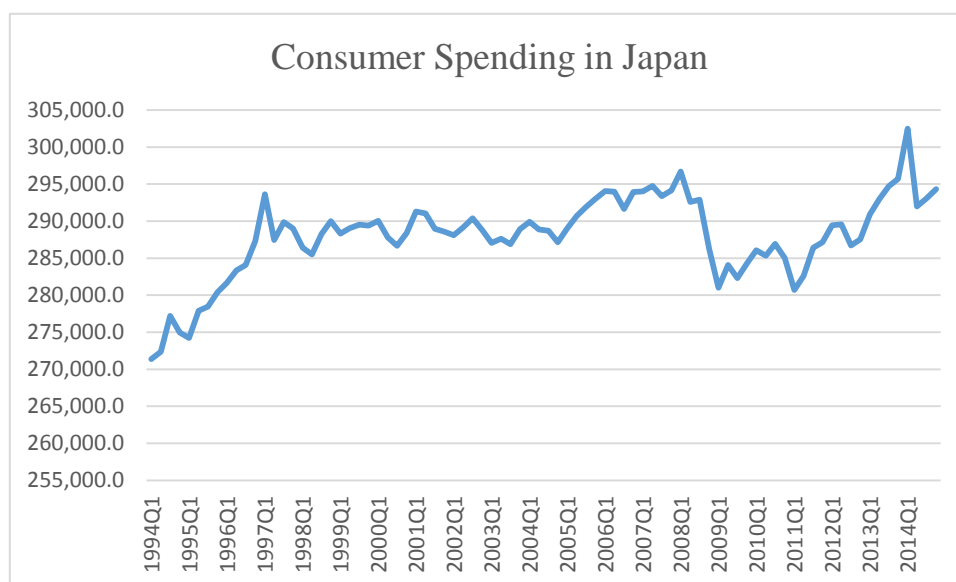


Figure 1 The Housing Price Index in Tokyo Metro Area

As shown in Figure 2, consumer spending in Japan was sluggish from 1997 to 2008 and plummeted in 2008 caused by the global financial crisis. In 2012, consumer spending started to increase as the Prime Minister Abe launched the economic reform policy, but the upward trend reverted in 2014. Many studies analyzed the causes of “lost decade” and some suggested that the decline of asset prices (including land and buildings) was one of the important factors. Real estate industry is often regarded as the locomotive industry. In other words, real estate market leads the business cycle.

Due to the high real estate prices, however, a number of research also indicated that housing dragged down consumers' spending and economic growth. For example, governments in China and Korea used to oppose housing investment because its return was lower than manufacturing and infrastructure industries in a certain period. Recent studies indicate that rise of housing price increased owner's wealth and caused "wealth effect", and eventually led the consumption to increase. Buiter (2008) found that fluctuation in housing prices did not cause wealth effect if the analysis is from the prospect of fundamental value. Conversely, if the relationship between housing price and consumption is analyzed from speculative value, there is positive relationship and could increase owner's consumption.

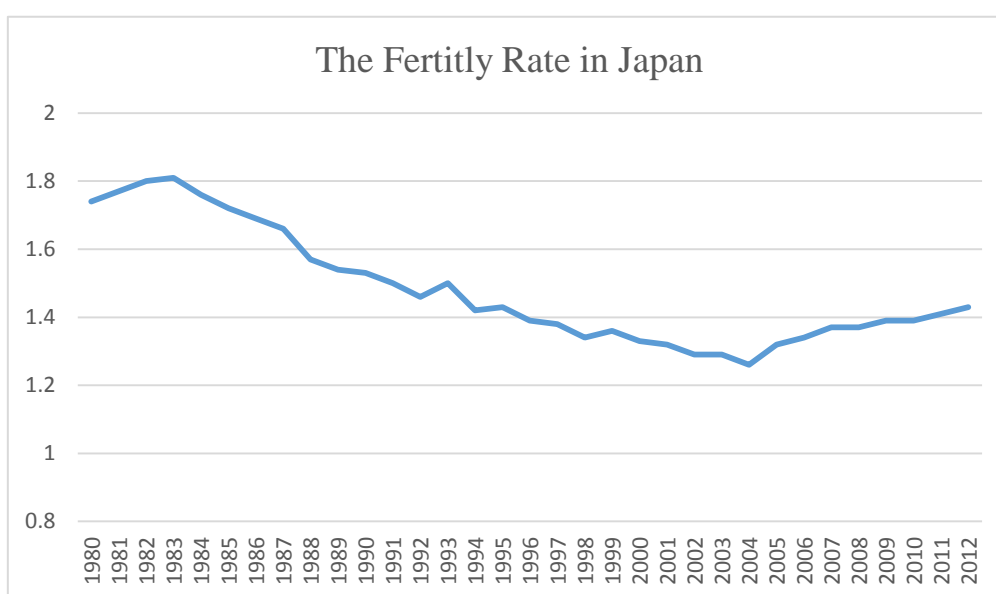


Source: TEJ database.

Figure 2 Consumer Spending in Japan, 1994-2014.

In addition to the recent worldwide deflation crisis, stagnant population growth and rapid aging problems has become one of the most important issues to developed countries. In Japan, the decline of birth rate and increasing of elderly population has

led to the decrease of labor force year by year. As shown in Figure 3, according to the Ministry of Health, Labor and Welfare, the fertility rate declined from 1.81 in 1984 and to 1.26 in 2005. Although there have been gradually rising since 2005, Japan is still considered a low fertility country. Some researchers have warned the “low-fertility trap” from the prospect of demography. If low fertility rate continued for a long time, under the mechanism of social self-reinforcing, it could form a vicious cycle. If there is no interference or stimulant by external forces, the situation may aggravate (Lutz and Skirbekk, 2005).



Source: Ministry of Health, Labor and Welfare, Japan.

Figure 3 The Fertilty Rate in Japan

There are many studies focusing on the reasons of consumption downturn and the decline of fertility rate from different perspectives. Horioka (2006) analyzed the reasons of the stagnation of household consumption during the 1990s and found that the stagnation of household disposable income, the decline in household wealth and increased uncertainty about the future are significant factors. From the aspect of fertility studies, previous literature mostly focused on issues such as culture, social and economic, education, or female labor participation. From the view of economics

theory, economic growth is closely related to and fertility. Recently, some studies started to indicate that real estate market is one of an important factor to affect the fertility behavior. (Krishnan and Krotki, 1993 ; Mulder, 2006 ; Mulder and Billari, 2010 ; Yi and Zhang, 2010). From households' view, there might be crowd-out effect for alternatives in maternity and buying houses because of limited budget. Becker (1960) proposed the New Family Economic Theory, which suggested that parents make decision of fertility by household income, parenting costs and opportunity costs. In general, high income family represents a higher opportunity costs of giving birth. Jone et al. (2008), for example, suggested that fertility rate and income had a negative relationship in most countries.

As discussed above, according to the New Family Economic Theory, changing in housing prices have been one of the important factors affecting household consumption and fertility decision making. Based on this theory, this study attempts to combine housing prices, household consumption and fertility to explore their interrelation. In order to understand these factors interaction in the deflation background, the research period selects the "Heisei recession" after bubble burst during 1990s and 2000s. It is expected that the results of this study may provide policy recommendations to boost up consumption and promote economic growth in Japan and other developed economies.

## 2. Literature Review

### (1) Theory and Literature of Expenditure

#### A. Consuming Behavior

There are many studies exploring consuming behavior. For example, Permanent

Income Hypothesis proposed by Friedman (1957) assumed that people's consumption at a certain point is determined not just by their current income but also by their expected income in the future, i.e., their permanent income. Another famous theory of consuming behavior is Life-cycle hypothesis proposed by Ando and Modigliani (1963), which suggests that households plan their consumption and saving behavior over their life cycle. In other words, they make their decision to equalize their consumption and saving. Therefore, if the proportion of the population structure changes in a country, their marginal propensity to consume could change as well.

#### B. The Relationship of Housing Prices and Household Expenditure

Many studies focus on the relationship between financial assets and consumption, and most of them show their significant and positive relationship. The more consistent result is "wealth effect". For instance, Poterba (2000) found that the rise of stock prices in the US caused increased consumption. A number of recent literature analyzed the relationship between fluctuation of housing prices and household expenditure (Ludwig and Slok, 2002 ; Morris, 2006 ; Campbell and Cocco, 2007 ; Mian and Sufi, 2009 ; Christopher et al., 2010 ; Smith, 2010 ; Cooper, 2010 ; Case et al., 2013). The effect of the change of housing prices on consumption could be conveyed through various ways. Lin et al. (2014) summarized it in four ways, they are (1) realized or unrealized wealth effect, (2) real estate mortgage or liquidity constraints affect, (3) the influence of budget constraints on tenants, and (4) the influence of purchasing new homes.

When housing prices increase, owners can realize the capital gains by selling houses, which further has the impact on residents' spending. As housing prices increase, moreover, owners may not cash increased wealth through selling houses. They may think that they were richer than before due to the expectation on capital gains, which could cause the consumption to increase. Simth (2010) analyzed the

relationship between housing prices and consumption in New Zealand from 1984 to 2007 and suggested that based on the “wealth effect”, owners could increase their consumption as housing prices increase. In addition, Case et al. (2013) indicated how housing market and financial market affect household consumption and suggested that both of them had a positive significance on household consumption in the US during 1975 to 2012. Further, they indicated that the influence level of housing market was greater than financial market.

Lee et al. (2015) studied the wealth effect of housing prices in six economies in Asia (i.e., Taiwan, Singapore, Korea, Japan, Hong Kong and Shanghai) by using pooled mean group (PMG) to capture the long-term and short-term relationship. Results show that there were significant wealth effects in the stock market, but the housing market had no significant effect on consumption. Lin et al. (2013) studied the effects of housing prices on economic growth and household expenditure based on the Fisher Equation. Their results showed the housing prices of first lag had a significant negative effect on current household expenditure, and stock prices of first lag had a significant positive effect on consumption. They concluded that an increase in housing price in Taiwan forced people to increase savings and decrease consumption. Eventually, the decrease in consumption led to declining economic growth.

Apart from capital gains from selling houses, when housing prices increase, households would relieve their liquidity constraint through refinancing from residential mortgage equity, which would further lead to an increase in consumption. Case et al. (2013) suggested that the innovation of lending institutions (for example, second mortgages in the form of secured lines of credit, and option-ARM first-mortgage contracts), made owners easy to extract cash from house equity. Glenn et al. (2006) studied household refinancing behavior in the US during 1983 to 2001. They found that homeowners withdrew through equity refinancing and spent 16

percent of liquidated equity for consumer expenditure. Haurin and Rosenthal (2006) also found that for each dollar of house price increase, households took on roughly 15 cents to repay debt and use it to finance consumer expenditure.

However, not everyone benefits from housing price appreciation. For non-owner occupied tenant, increasing of housing prices could lead to the increase of burden. Li and Yao (2007) suggested that there were different wealth effects of housing prices on different age groups. They studied households in the US and classified them into different age groups and area groups. Their results showed that there were wealth effects of increasing housing prices on old homeowners. In contrast, for young homeowners, the benefits from the appreciation of housing prices cannot offset the increase in housing costs in the future. For tenants, they cannot benefit from appreciation of housing prices. In summarize, there exist wealth effect for old owners and negative wealth effect for young owners and tenants when housing prices increased. In other words, when housing prices increased, young people and tenant would need to increase their savings and thus resulted in a negative effect on consumption.

## (2) Theory and Literature of Fertility Behavior

### A. Factors of Impact on the Fertility Behavior

Due to the low fertility rate in many developed countries, there have been a growing number of literature focusing on the factors affecting the fertility behavior in the last two decades. Parts of them studied it from socio-economic structure change perspectives, and some analyzed it from cultural and social perspectives. Socio-economic perspective can be divided into macroeconomic factor and female factor. In macroeconomic factor perspective, several studies have found that GDP,



household income, unemployment rate, homeownership rate and ratio of house price to income had significance effects on fertility rate. (Schultz, 2001 ; Jones et. al, 2008 ; Bar and Leukhina, 2010). In addition, Becker (1991) considered that female had most of the responsibility of parenting children. The increasing of female wage and female labor participation rate could lead to the rise of the opportunity costs of parenting children, and cause the fertility rate to decrease. Therefore, many literature add the female factor into the model and found that female wage, female labor participation rate and education degree of female had significant effects on fertility behavior (Becker, 1991 ; Li, 2008).

Freedman (1995), for example, suggested that socio-economic development, family planning and decreasing of mortality rate had significant effects on fertility rate. However, Andreassen (2004) indicated that how the mortality affects fertility is up to how the government caring sector has expanded and how much human capital has been accumulated. His study found that as the public caring system started to develop in the beginning, the effect of decreasing mortality rate on fertility is found to be positive. In contrast, the effect is found to be negative in the latter stage for higher levels of public care.

#### B. The “New Family Economy” Theory

Becker (1960) proposed the “New Family Economy Theory” and changed the assumption of fertility decision making. This theory treats children as durable goods and suggested that fertility is determined by income, children-raising costs, knowledge, uncertainty, and tastes. Therefore, when household income increases, fertility rate could increase as well. Besides, due to households’ limited budgets, the optimum of children and other goods can be derived. Furthermore, this theory considered that the total costs of parenting children should include the shadow prices, i.e. the labor opportunity costs of parents. Barro and Becker (1989) treated children as

lasting goods as well and assumed that parents make decision of giving birth by their rational analysis. Becker (1991) further included the quality of children into utility function to extend the discussion and found that both numbers and quality of children are influenced by the shadow prices of raising children.

Many empirical studies tried to examine the New Family Economy Theory. Willis (1973) studied the relationship between household income and fertility rate, and found the higher wage rate could increase the opportunity cost of giving birth to another child. The rise of opportunity cost could lead to reduce the possibility of having another child. In addition, Hechman and Walker (1990) suggested that female income had a significant negative effect on fertility rate. In summary, there exists the income effect between male income and fertility rate, and substitution effect between female income and fertility rate.

### C. The Relationship between Housing Prices and Fertility Rate

New Family Economy Theory emphasized that households make their decision of giving birth by the opportunity costs. There were many studies focusing on how women's time value and opportunity cost affected fertility rate (e.g., the increase of female labor participant rate or the rise of female wage). However, if we only discuss the change of fertility behavior by the fluctuation of population or the change in society structure, other factors may be ignored and cause the analysis error. For households, houses have been considered as necessity as one of the most important assets for most families. The appreciation of housing prices could cause homebuyers high payment pressure. If the burden is heavier than the affordability of households' income, fertility could be crowd out by their rational decision making. There were many studies indicated that fluctuation of housing price was one of the important factors affecting fertility rate. ( Krishnan and Krotki, 1993 ; Mulder, 2006 ; Mulder and Billari, 2010 ; Yi and Zhang, 2010 ) .

Kohler et al. (2002), for example, indicated that housing accessibility was one of the reasons causing low fertility rate in Europe. Hui (2012) examined the relationship among fertility rate, housing price and dependency ratio in Hong Kong and found that the appreciation of housing prices led to the decrease of fertility rate. Simon et al. (2009) analyzed the relationship between housing prices and fertility in the US during 1940 to 2000 by census data. Their empirical results showed that housing prices had a negative effect on fertility rate. Studies cited above support the exclusion effect between housing prices and fertility rate. However, another group of studies suggested that there were positive relationship between them. In other words, increasing housing prices could lead the owners to increase their willingness to give birth because of the expected anticipation of house price appreciation. Dettling and Kearney (2014) divided the population in the US metropolitan into home owners and non-owners. They suggested that a 10,000 increase in housing price led to 2.1 percent increase in birth among home owners, and a 0.4 percent decrease among non-owners.

In summary, most recent studies included the factor of “changes in housing prices” in the model to discuss the relationship between housing prices and fertility rate. According to the New Family Economy Theory, children are considered as normal goods. Therefore, the appreciation of housing prices and its pressure of buying houses could decrease the parents’ willingness to have children. In other words, housing price is the “shadow price” (opportunity cost) of parenting children, and high housing prices may result in the decrease of fertility rate.

### (3) Summary

Japan fell into the so-called “lost two decades” since the early 1990s. After the burst of real estate bubble, the housing prices started to decline and bank bad debts surged. Households were affected by the declining property prices, and consumption and investment continued to be sluggish (Horioka, 2006). Japan government has tried

to revive the economy by implementing many policies, e.g., reducing the corporate taxes or issuing consumption coupons. Central Bank of Japan also implemented the quantitative easing (QE) policy in 2001 and 2008. However, the effect of these policies on revising the economy was limited.

Horioka (2006) considered that the downturn of household consumption was one of the reasons causing Japan sluggish economy. As discussed above, there were many factors affecting household expenditure, including change of income, decision of fertility or change of housing price. The New Family Economy Theory assumed that parents would make their decision making of giving birth after considering the shadow price of parenting children. According to previous literature, there were positive effect or negative effect of housing prices on household consumption. In addition, there were positive or negative relationship between housing prices and fertility rate. According to the New Family Economic Theory, due to the limited budget of household, household consumption and fertility rate could exist mutual exclusion relationship. This study thus intends to explore the relationship among housing prices, household consumption and fertility rate based on the New Family Economy Theory.

### 3. Research Method

#### (1) Research Design

The purpose of this study is to explore the dynamic relationship between housing price, fertility rate, household expenditure and other variables. Since there could exist unit root and structure change in the time series, we use CUSUM test and unit root test to examine the stationarity of these variables before the cointegration test or vector autoregression (VAR). If all the series are stationary, we then employ VAR

model to examine their relationship. If all or parts of series are non-stationary, we then employ the cointegration test proposed by Johansen (1998) to analyze the variables of a long-term equilibrium relationship. If there is no cointegration relationship, we then apply “vector error correction model” (VECM) for further study. Finally, we use Granger causality test (Granger, 1969) to examine the lead-lag relationship between these variables.

#### A. Structural Change

Many potential factors could cause structural change, including the financial crisis, the stock market crash or policy shocks to disrupt economic development. Perron (2005) indicated that structural change will bias the unit root test statistics toward the non-rejection of unit root. It is therefore necessary to confirm whether there is structural change during the research period. In this study, we apply the Cumulative Sum of the recursive residuals (CUSUM test) to test the structural change. If there are structural changes in the sample series, we need to reduce the research period to no structural change to avoid the error in estimation.

#### B. Unit Root Test

Many macro-economic time series variables have the non-stationary characteristics. Non-stationary series, if caused by random shocks, may lead time series data not to converge to the original equilibrium. If we use non-stationary variables in the regression or other statistical models, results might be spurious (Granger and Newbold, 1974). Unit root tests provide basis for assessing whether if a time series is stationary, or integrated of a particular order. Hence, we employ Augmented Dickey-Fuller (ADF) unit root test proposed by Dickey and Fuller (1981) and Phillips-Perron (PP) unit root test proposed by Phillips and Perron (1988) to examine the existence of unit root.

### C. Cointegration Test

According to Engle and Granger (1987), if time series variable is non-stationary, it could become stationary after taking  $d$ -time difference, which means the series are integrated of the  $d$  order. When two non-stationary variables are integrated of the same order, and a linear combination relationship of them is stationary, then there is cointegration relationship in these variables. However, this approach can not examine more than two variables because there may be more than one cointegration vector. In this study, we use cointegration test proposed by Johansen (1988). The Johansen cointegration approach is a maximum likelihood estimation of a fully specified error correction model, which can examine more than one cointegration vector. This method is robust to interpret the multiple long-run equilibrium relationship between variables. Johansen (1988) proposed the Trace and Maximum Eigenvalue test to determine the number of cointegration.

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \lambda_i)$$
$$\lambda_{max}(r, r + 1) = -T \ln(1 - \lambda_{r+1})$$

$T$  is the number of observations and  $\lambda_i$  is the value of characteristic roots. The null hypothesis of the Trace is  $H_0 : rank \leq r$ . For the null hypothesis of the Maximum Eigenvalue test is  $H_0 : rank = r$ .

### D. Vector Autoregressive Model and Vector Error Correction Model

Vector Autoregressive model (VAR) is appropriate to explore the dynamic interrelationship between all series (Sims, 1980). In each equation, each variable can be represented by the lag periods of its own and other variables. According to Engle and Granger (1987), if there is cointegration relationship between variables and there

is long-run equilibrium, we can combine the cointegration in the error correction model for Vector Error Correction Model (VECM). VECM is an appropriate model for a set of cointegrated variables. By VECM, we can explore the short-term dynamic adjustment to estimate the relationship between variables and how they affect each other.

#### E. Granger Causality Test

Granger causality test was proposed by Granger (1969). The main purpose of this methodology is to examine the existence of lead-lag relationship between two variables. In other words, it can investigate the ability of one series to predict another based on its past value. If current and past value of  $Y_t$  is able to predict future value of  $Z_t$ , it is said that  $Y_t$  does Granger cause  $Z_t$ . Moreover, if there is an interaction between two variables, then the result indicates there is feedback relation between two variables.

### (2) Data Description and Processing

A. Data employed in this study is shown in Table 1. Fertility rates of Japan are collected from the Ministry of Health, Labor, and Welfare, and housing price index is from the Ministry of Land, Infrastructure, Transport and Tourism. Other variables (household expenditure, household disposable income, consumer price index, unemployment rate and rate) are collected from Taiwan Economic Journal (TEJ) database. All the variables are quarterly data. The research was conducted from Q1 of 1996 to Q4 of 2013 with 72 quarterly data in total.

#### B. Data Source

Table 1 Data Source

	Variable	Code	Source	Time Period
Dependent Variables	Household expenditure	CS	TEJ Database	1996-2013
	Fertility rate	FR	Ministry of Health, Labour, and Welfare	1996-2013
Independent variables	Housing price index	HPI	Ministry of Land, Infrastructure, Transport and Tourism	1996-2013
	Household disposable income	INC	TEJ Database	1996-2013
	Consumer price index	CPI	TEJ Database	1996-2013
	Unemployment rate	UR	TEJ Database	1996-2013
	Interest Rate	INT	TEJ Database	1996-2013

### C. Data Analysis and Processing

The description of statistical variables includes mean, median, maximum, minimum, and standard deviation, as shown in Table 2.

Table 2 Data Analysis

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
CS	288881	288922	294800	281787	3285.6	72
FR	1.356	1.363	1.434	1.255	0.048	72
HPI	90.475	83.758	129.474	77.055	14.690	72
INC(%)	67.38	77.84	263.27	-115.4	82.73	72
CPI	101.23	100.75	103.76	99.53	1.25	72
UR	4.45	4.50	5.38	3.28	0.59	72
INT	0.34	0.31	0.82	0.03	0.24	72

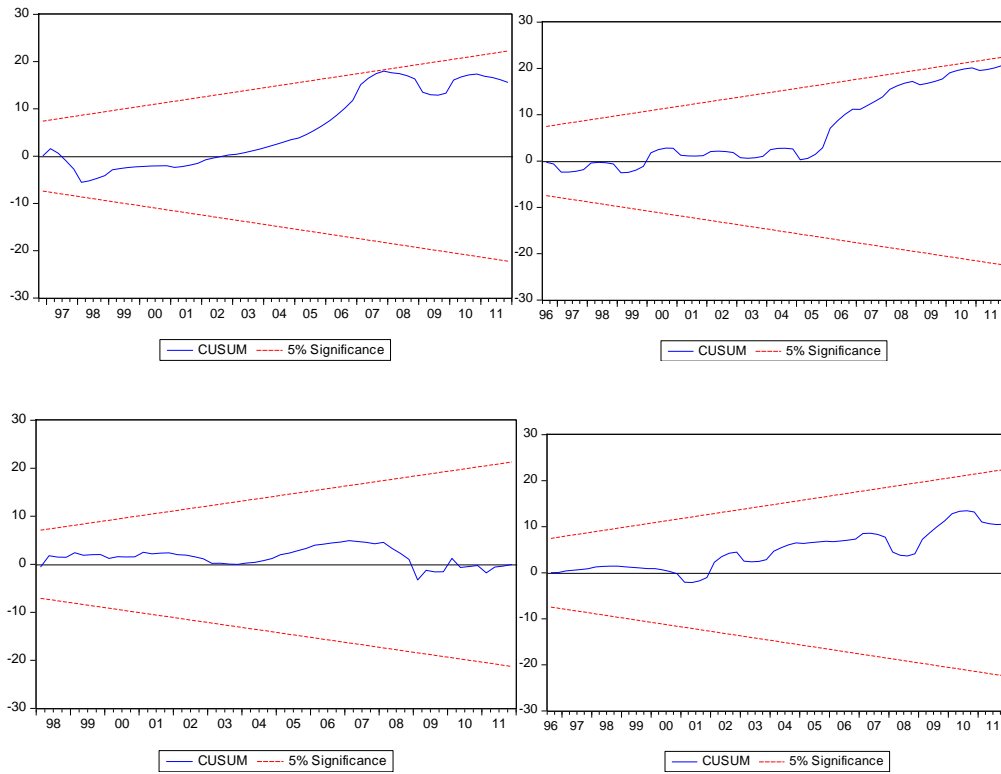


## 4. Empirical Result

### (1) Structural Change

Structural Change is one of the reasons to cause non-stationarity. For correct empirical results, we should identify whether the series has the structural change during the research period. This study applies the Cumulative Sum of the recursive residuals test (CUSUM test) to verify whether there are structural changes among variables.

Results of CUSUM test are shown in Figure 4, which suggest that there is no structural change for all variables at 5% significance level during the research period.



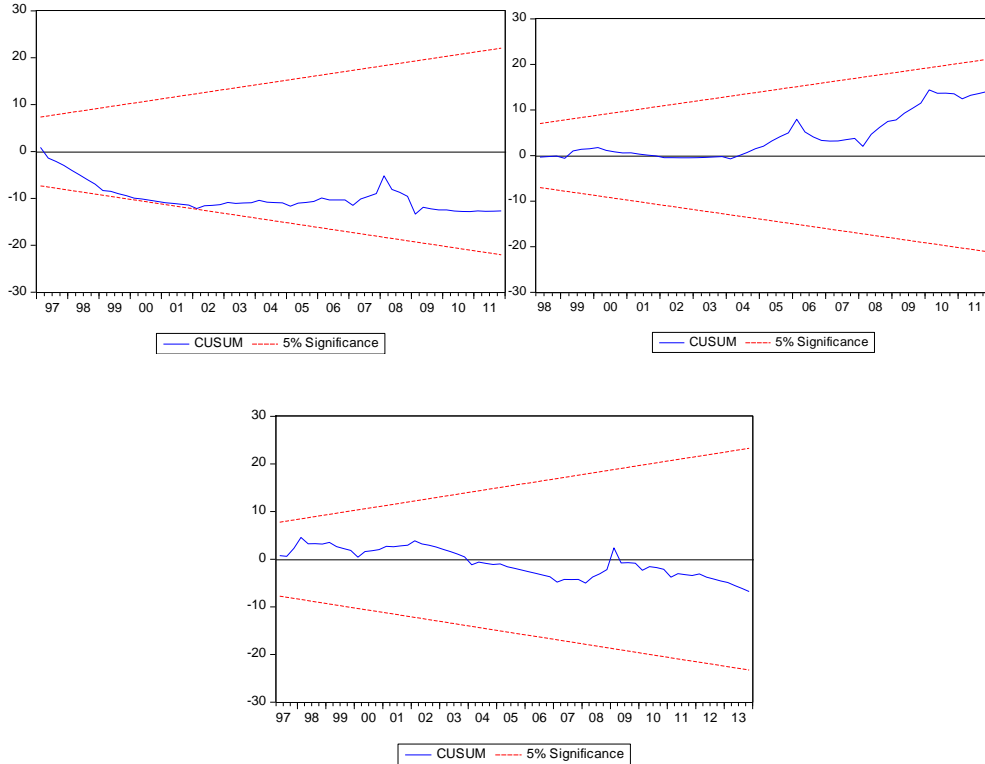


Figure 4 Results of CUSUM Test

## (2) Unit Root Test

The next step is to examine whether the time series of variables contain unit roots. If the time series is non-stationary, the regression results might be spurious (Granger and Newbold, 1974), Therefore, we employ Augmented Dickey-Fuller test (ADF) proposed by Dickey and Fuller(1981) and Phillips-Perron (PP) by Phillips and Perron(1988) test to examine whether the variables contain unit roots.

Table 3 shows the result of unit root test. In ADF test, all variables do not reject the null hypothesis of non-stationarity. In other words, these time series are not stationary. In PP test, THPI and INC reject the null hypothesis, but others do not reject it. After the first difference, all variables in both the ADF and PP test reject null hypothesis for the series, i.e., they are stationary variables after the first difference. All the variables after the first difference are denoted as I(1) series.

Table 3 Unit Root Tests--- ADF Test and PP Test

	ADF test		PP test	
	Level	1 <sup>st</sup> difference	Level	1 <sup>st</sup> difference
THPI	0.447	-2.153**	-3.310***	-3.225***
FR	0.364	-1.918*	-0.071	-4.751***
CS	0.248	-2.815***	0.836	-4.383***
INC	-1.295	-2.682***	-2.196**	-5.414***
INT	-0.585	-4.102***	-0.685	-4.240***
CPI	-0.388	-2.456**	-0.082	-3.579***
UR	-0.263	-3.254***	-0.008	-3.307***

Note1. \*, \*\*, \*\*\* denotes the significance at the 10%, 5% and 1% level, respectively.

### (3) Cointegration Test

Before examining the cointegration test, vector autoregressive model or vector error correction model, we should decide the optimal lag length. We select optimal lag length based on the Akaike information criterion (AIC) and Schwarz information criterion (SC). Results are shown on Table 4, the lag of four periods is appropriate for the equation. We then conduct cointegration test by using the four-lag length.

Table 4 Lag Length Selection

LAG	AIC	SC
1	4.527	6.326
2	6.076	7.890
3	6.725	8.553
4	0.838*	2.681*
5	6.524	8.382
6	6.859	8.733

To examine whether there is long run equilibrium relationship between all the variables, we employ the cointegration test proposed by Johansen (1988). If there is a cointegration between variables, we could observe the short-term dynamic relationship of variables by estimating VECM. If there is no cointegration, we could examine the interrelation among them through the VAR model.

Results of the cointegration test are shown in Table 5. According to the trace statistics, the null hypothesis of at most six cointegration vector is rejected at 10% significance level. However, the null hypothesis of no cointegration vector is rejected at 5% significance level in the max-eigen statistic. As two statistical tests show different result, according to Johansen and Juselius (1990), trace statistics might be better when the eigenvalue is equally distributed. On the contrary, if the eigenvalue shows the unequal distribution, we may apply the max-eigen statistics. As shown in the Table 5, the eigenvalue is equally distributed, we therefore adopt the results from the trace statistics. The results indicate that all the variables appear to have long-term equilibrium in the research period. In other words, there is a long term co-movement between these variables.

Table 5 Cointegration Test

Null hypothesis	Eigenvalue	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
None	0.520	166.559	125.615***	48.466	46.231**
At most 1	0.380	118.093	95.754***	31.568	40.077
At most 2	0.324	86.525	69.819***	25.830	33.877
At most 3	0.298	60.964	47.856***	23.344	27.584
At most 4	0.260	37.250	29.797***	19.889	21.132*
At most 5	0.194	17.461	15.495**	14.243	14.265*
At most 6	0.048	3.218	3.841*	3.219	2.841*

Note: \*, \*\*, \*\*\* denotes that null hypothesis of no cointegration can be rejected at 10%, 5%, 1% significance level, respectively.

#### (4) Vector Error Correction Model (VECM)

As discussed, if we observe the cointegration relationship between these variables, we then investigate their short term dynamic relationship by vector error correction model (VECM).

According to the estimated result of VECM (as shown in Table 6), fertility rate of fourth lag had a positive significance on current housing prices. This finding, however, is against the theory of New Family Economy which indicates that giving birth and buying house could exclude each other because of household's limited budget. We can explain the result from the fundamental view. When households decide to give birth, the demand for houses could increase and cause housing prices to rise. In Japan, fertility rate continued to decline from 1995 and began to reverse since 2005. It could be the reason that the change of fundamental demand resulted in the appreciation of housing prices. In addition to this finding, fertility rate of fourth lag had negative effects on current household expenditure. The result tends to accept the assumption that households could reduce other expenditures as they are subject to the cost of raising children.

Next, we investigate the relationship between housing prices and household expenditures. Results show that household expenditure of fourth lag had positive effects on current housing prices. In Japan, housing prices continued to decline after the burst of bubble in early 1990s. Households are unwilling to consume and buy houses so the change of household expenditures and demand for houses tend to move in the same direction. On the other hand, housing prices of fourth lag and current household expenditures are negatively correlated with each other, indicating that there is mutually exclusive relation between these two variables. Buying house could be one of the reason decrease in household consumption. This finding is in line with the research of Lin et al. (2013), which found the negative relationship between housing

prices and household expenditures in Taiwan.

It is worth noting that interest rate of fourth lag had a positive effect on current housing prices and current household expenditure. The monetary policy of the recent two decades in Japan mainly adopted low interest rate policy, through which the government expects to simulate people to consume and enterprises to invest. It is expected that low interest rate policy may reduce the costs of buying houses for home buyers. Further, builders can finance at lower costs. The cut of interest rates is expected to have a positive effect on the real estate market. The reason of variables changed in the same direction could be that people was not optimistic to the economic prospects in the future under the trend of deflation, which limited the effect of low-interest rate policy. Furthermore, CPI of fourth lag had negative effects on current housing price index, fertility rate and household expenditures. People could consume more while the price levels decline, indicating that low-price level could simulate the behavior of home purchase and other consumption. On the contrary, it is worth noting that the slow growth or decrease of CPI may also be the indicator of sluggish consumption and economic growth.

Table 6 Results of VECM Analysis

	THPI	FR	CS	INC	CPI	INT	UR
Variables							
CointEq1	-0.137	0.004	-156.643	0.134	-0.181***	0.034**	-0.013
CointEq2	4.686	-0.717**	15462.74	-14.445	22.086***	-4.581***	1.062
CointEq3	<-0.001	<-0.001	-0.222**	<-0.001	<-0.001	<0.001	<-0.001
CointEq4	0.113	-0.008	73.512	-0.944**	0.501***	-0.044	-0.034
CointEq5	-0.337	-0.002	302.272	-0.160	-0.068	-0.054*	0.012
THPI(-1)	0.186	-0.001	176.039	-0.010	0.091*	-0.004	0.006
THPI(-2)	0.153	-0.001	157.598	-0.040	0.109**	-0.006	0.018
THPI(-3)	0.140	-0.001	156.056	-0.044	0.109**	-0.007	0.021
THPI(-4)	-0.062	-0.001	-602.3***	-0.240***	0.268***	-0.040***	-0.032
FR(-1)	2.455	0.376*	-13132.34	9.726	-11.932**	3.629***	0.366

FR(-2)	1.283	0.415**	-10042.37	7.586	-10.385**	3.369***	0.386
FR(-3)	1.699	0.420**	-8407.395	7.127	-9.557**	3.234***	0.303
FR(-4)	35.861**	-0.321*	-19895.6*	-2.036	-12.395***	1.178	-2.764
CS(-1)	<0.001	<-0.001	0.023	<-0.001	<-0.001	<0.001	<0.001
CS(-2)	<0.001	<-0.001	0.050	<0.001	<0.001	<-0.001	<0.001
CS(-3)	<0.001	<-0.001	0.057	<0.001	<0.001	<-0.001	<0.001
CS(-4)	<0.001***	<0.001	-0.226***	<0.001	<-0.001***	<0.001	<-0.001
INC(-1)	-0.203	0.004	-28.998	0.364	-0.233**	0.002	0.004
INC(-2)	-0.140	0.003	-31.404	0.442*	-0.265**	0.005	-0.002
INC(-3)	-0.140	0.003	-36.900	0.465**	-0.286***	0.007	-0.004
INC(-4)	-0.765**	-0.003	185.331	-0.126	-0.325***	0.039	0.087**
CPI(-1)	0.247	-0.002	381.061	-0.115	0.221	-0.041	-0.089
CPI(-2)	0.143	-0.003	183.920	-0.126	0.210	-0.037	-0.043
CPI(-3)	0.039	-0.002	116.284	-0.119	0.152	-0.032	-0.029
CPI(-4)	-2.772***	-0.015***	-4161.0***	0.747***	-0.580***	-0.025	0.465***
INT(-1)	0.036	0.012	2024.487	0.262	0.014	-0.082	-0.384
INT(-2)	-0.075	0.015	616.322	0.381	-0.397	0.087	-0.280
INT(-3)	-0.090	0.013	-130.774	0.282	-0.417	0.145	-0.201
INT(-4)	8.678***	0.054**	9547.53***	2.682**	-0.585	0.421***	-0.558*
UR(-1)	2.059	0.003	1348.771	-0.339	0.749	0.100	-0.077
UR(-2)	1.505	0.004	1037.568	-0.707	0.956**	0.075	0.091
UR(-3)	1.353	0.003	974.394	-0.782	0.987**	0.067	0.129
UR(-4)	6.495***	0.018	-5526.1***	1.202	0.470	-0.036	-0.190
C	0.023	<0.001	-3.428	-0.001	0.002	-0.003	-0.002

Note: \*, \*\*, \*\*\* denotes that null hypothesis of no cointegration can be rejected at 10%, 5% and 1% significant level, respectively.

#### (5) Granger Causality Test

Granger causality test is to determine whether one time series is useful to forecast the other. According to the results of Granger causality test in Table 7, the results reject the null hypothesis that THPI does not Granger causes FR, INC and CPI at 1% and 5% significant level. The results suggest that THPI performance leads the future movements of the FR, INC and CPI. CS appears to lead THPI and INC, and

CPI appears to lead THPI, CS and UR. Furthermore, interest rate (INT) appears to lead THPI. These results are consistent with our assumption. When the housing price rises, households' willingness to give birth may be reduced due to limited budget, which could also affect the movement of CS and THPI. In addition, interest rate can be used as a leading indicator of housing prices.

Table 7 Results of Granger Causality Test

Dependent Variables	Independent Variables						
	THPI	FR	CS	INC	CPI	INT	UR
THPI	--	1.822	2.302*	1.598	4.121***	2.568**	1.082
FR	5.925***	--	0.130	0.504	0.234	0.738	0.386
CS	0.326	0.070	--	0.990	3.846***	1.481	0.751
INC	2.786**	0.409	2.240*	--	0.285	0.533	5.177***
CPI	2.915**	0.329	0.916	0.511	--	1.658	2.466*
INT	0.552	1.424	0.673	0.300	1.352	--	0.375
UR	1.055	0.046	0.236	3.244**	10.302***	1.722	--

Note: The null hypothesis of Granger causality test is "independent variable does not granger cause dependent variables". The number in the table is chi-square value.

## 5. Conclusion and Implication

### (1) The Verification of "New Family Economy Theory"

This study adopts the New Family Economy Theory proposed by Becker (1960) to test the experiences in Japan. Previous study, i.e., Simon et al. (2009), Hui (2012) and Lin et al. (2013), all found the negative relationship between fertility rate and housing price.

#### A. The Fertility Rate and Housing Price tend to move in the same direction

As the results of VECM, fertility rate of fourth lag had a positive effect on



current housing prices. This finding is different from the new family economic theory and previous studies. The possible explanation is that fertility rate continued to decline and rebound in 2005 while housing price index picked up during the same period. Japan's housing price could be back to fundamental (i.e., habitat) demand after the burst of bubble. Therefore, the mutual exclusion effect of giving to birth and buying house is unable to verify in Japan.

#### B. The mutual exclusion effect between giving birth and consumption

Results of VECM indicated a significant negative effect between fertility rate of fourth lag and household expenditure. We can explain the results according the new family economics. Since new members of households (i.e., children) will be new variables in the utility function for families, households should make a selection between giving birth and consumption according to their rational decision due to the limited budget. Both low fertility rate and low household consumption are important issues for the whole country in Japan. The government should avoid the limited effectiveness in policy making due to the mutual exclusion of these two factors. Besides finance and taxation measures, maternity subsidy and fertility reward may also be adopted to encourage giving birth and consumption.

#### (2) Different results on the wealth effect of housing price appreciation

A number of previous studies suggest that appreciation of housing price could bring wealth effect through various channels (Carroll et al., 2006 ; Case et al., 2013). Conversely, some studies indicated the negative relationship between housing prices and consumption as housing prices could crowd out consumption and the subsequent economic growth (Lin et al., 2013). The empirical results in this study suggest that housing prices of fourth lag had a negative effect on current consumption, which is consistent with Lin et al. (2013). The explanation for the different results in the US

versus Japan and Taiwan may be that the refinancing activities from home equity in the US are more prevailing than those in Japan and Taiwan, which lead to higher liquidity of mortgage equity withdrawal (MEW) behavior in the US than Japan and Taiwan. The appreciation of housing prices could therefore enhance homeowners' wealth and then encourage consumption and result in the wealth effect. In contrast, the home equity refinancing behaviors in Japan or Taiwan are not as popular as in the US. Homeowners tend to keep the houses as heritage for next generations as mortgages are paid off in Japan and Taiwan. Appreciation in the housing prices only seems to be "paper wealth" if owner did not realize their gains by selling houses or refinancing. In addition, households in Japan and Taiwan treat houses as an important security target in their whole life as well as socioeconomic status. Thus, when housing prices exceed people's affordability, households could increase savings and decrease consumption for future mortgage payment. Finally, household expenditures tend to decrease because of the surge of housing prices. In summary, this study suggests that the reasons of different empirical results in different countries could be affected by the financing behaviors of households, traditional belief in relation to affordability of housing prices.

### (3) Conclusion

An increasing number of studies have focused on the recent stagnant wage growth and consumption as house prices increases. Japan is the typical example of deflation after bubble burst in the early 1990s. Becker (1960) proposed the New Family Economic Theory which treats children as a normal good and suggests that parents may make the decision of fertility by their rational analysis. Based on this theory, there should be conflicting relations between decisions on buying houses, consumption and giving birth. There were many studies exploring the relationship between housing prices and consumption, and the relationship between fertility rate

and housing prices. However, few studies were found to discuss these three issues at the same time. In view of this gap, this study combined these three factors to explore their inter-relationship in the environment of “Heisei recession” in Japan.

Empirical results show that fertility rate of fourth lag had a negative significance on current household expenditure. However, fertility rate of fourth lag had a positive significance on current housing price. The possible explain is that change of fundamental demand results in the decline of housing prices. In addition, some studies indicated that appreciation of housing price could lead to wealth effect for homeowners through many different ways. The results show that household expenditure of fourth lag had a positive effect on current housing price. In other words, they exist mutual exclusion effects. Different results may be attributes to the refinancing behaviors, traditional belief and housing affordability. We expected the results of this study may provide precious viewpoints to explain the causes of low fertility rate and low consumption in relation to high housing prices, and offer some implications for the decision making in the housing and financing polices in the future.

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# 科技部補助計畫衍生研發成果推廣資料表

日期:2016/11/10

科技部補助計畫	計畫名稱: 從日本經驗看高房價對經濟成長、國民消費及少子化之影響
	計畫主持人: 林左裕
	計畫編號: 104-2410-H-004-197- 學門領域: 地政
無研發成果推廣資料	



104年度專題研究計畫成果彙整表

計畫主持人：林左裕			計畫編號：104-2410-H-004-197-				
計畫名稱：從日本經驗看高房價對經濟成長、國民消費及少子化之影響							
成果項目			量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)		
國內	學術性論文	期刊論文		0	篇	2016 中華民國住宅學會學術研討會	
		研討會論文		1			
		專書		0	本		
		專書論文		0	章		
		技術報告		0	篇		
		其他		0	篇		
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
		其他		0			
	技術移轉	件數		0	件		
		收入		0	千元		
	國外	學術性論文	期刊論文		0	篇	2016 International Conference of American Real Estate and Urban Economics Association (AREUEA) Alicante, Spain
			研討會論文		1		
			專書		0	本	
專書論文			0	章			
技術報告			0	篇			
其他			0	篇			
智慧財產權及成果		專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			

		著作權	0		
		品種權	0		
		其他	0		
	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	2		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)			1. 投稿中英文期刊中。 2. 提供國內外住宅政策，貨幣政策，及人口與經濟發展政策之參考。		

## 科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文： 已發表  未發表之文稿  撰寫中  無

專利： 已獲得  申請中  無

技轉： 已技轉  洽談中  無

其他：（以200字為限）

已於2016年7月 International Conference of American Real Estate and Urban Economics Association (AREUEA) Alicante, Spain 之研討會發表，目前期刊投稿中。

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

近年來，各已開發國家持續出現經濟成長減緩、薪資成長停滯與消費需求持續低迷之情形，屢有是否會陷入通貨緊縮之探討。日本自1990年代泡沫破裂以來，陷入「失落的十年」，在此二十多年間，房價暴跌、國民消費持續低迷與低生育之情形，相當值得作為已開發國家之借鏡。本文遂以新家庭經濟學理論為核心，綜合探究生育、購屋與消費支出之相互關聯。

由日本經驗可知房價高漲後，將排擠未來購屋族群之消費能力及生育意願，進而導致低迷之經濟成長與少子化現象。此結論顛覆了以往“不動產是火車頭工業”的論述，亦提供政策參考，不是一味地炒高房價即可拉抬經濟，此般鑑除了日本外，還有2008年的美國次貸金融風暴，及後續的西班牙金融危機。

4. 主要發現

本研究具有政策應用參考價值： 否  是，建議提供機關內政部，中央銀行，國發會

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現： 否  是

說明：（以150字為限）

結果發現生育行為與消費支出存在負向關聯，顯示家戶在預算有限之情形下，二者產生排擠效果。而生育行為與購屋行為則呈現同向變動關係，推測係自泡沫破裂以來，房價之變動回歸家戶之基本需求。此外，房價變動與消費支出亦存在相互排擠效果。此研究結論提供另一觀點探討低生育與低消費之成因，期望可對政策制定提供方向。