出國報告 **(**出國類別：參加會議**)**

出席「**CIRET** 研討會、執行委員會、**IFO** 經濟調查資料方法與應用研討會暨參訪慕尼黑生物科技園區及 **TVM** 創投公司」報告

服務機關：經濟建設委員會
出國人姓名職稱：葉明峯，副主任委員；秦羽翔，專門委員
赴派國家：德國
出國期間：96 年 10 月 18 至 25 日
報告日期：97 年 1 月 24 日

摘要

ＣＩＲＥＴ爲國際性經濟趨勢研究組織，經建會自 1983 年加入積極參與，與世界主要經濟景氣研究機構及政府單位合作並交換經驗與意見，不僅汲取最新研究方法與技術，亦展現我國積極貢獻國際專業社群之熱忱。

2007 年ＣＩＲＥＴ會員大會暨執行委員會於 10 月 18 日在德國慕尼黑 Ifo 研究院舉行，經建會係由葉副主任委員明峯率經濟研究處秦專門委員羽翔代表出席。會議通過前次會議記錄及 2006 年財務稽核報告、2007 年財務報告、2008 年預算，另外討論 2008 年第 29 屆研討會籌備情形，及執行委員名額上限。

Ifo 調查資料研討會於 10 月 19-20 日舉行，討論主題爲：調查方法、調查與貨幣政策、調查與景氣循環、調查與銀行行爲、調查與物價上漲預期、調查與經濟行爲調整、總體經濟預測、屬質與屬量調查及跨國研究等，多篇論文與我國景氣業務相關，其研究成果富參考價值。

慕尼黑生物科技園區爲歐洲重要高科技生物製藥育成中心，其在鼓勵技術移轉、創業諮詢顧問、公關及媒體服務、財務諮詢、輔導基金、融資方案等，均值得我國推動各類產業園區或經貿特區參考。德國 TVM 創投公司成立已逾 25 年，係行政院開發基金投資之一，其投資策略分析以及轉投資公司經營方向，反映全球生化製藥產業趨勢，可供我國發展生物科技產業及創投事業參考。

目次

出席「CIRET 研討會、執行委員會、IFO 經濟調查資料方法與應用研討會暨參訪慕尼黑生物科技園區及 TVM 創投公司」報告
（96 年 10 月 18 至 25 日）

壹、目的

一、　ＣＩＲＥＴ會議背景

ＣＩＲＥＴ（Centre for International Research on Economic Tendency Surveys，國際經濟趨勢調查研究中心）係世界主要國家經濟景氣研究機構及學者專家所組成之國際性研究交流團體，其會員係從事經濟趨勢調查，或利用調查之結果從事應用或理論研究。趨勢調查爲一屬質調查，與傳統屬量調查不同，乃調查企業家或消費者對經濟變動方向之判斷、計畫或預期等，或爲景氣調查、或爲投資或消費調查，近年來金融服務業調查應用日趨廣泛。

ＣＩＲＥＴ成立於1953 年，原有約750個會員，遍及全球51個國家。自1982年至1999年皆由德國Ifo經濟研究院院長Dr. Karl Heinrich Oppenländer 擔任會長，德國Darmstadt 大學法律經濟系教授Dr. Günter Poser 擔任顧問，秘書處則合併附屬於Ifo經濟研究院。1999年2月起Dr. Hans-Werner Sinn 接任第十五任院長，1999年底，ＣＩＲＥＴ脫離Ifo研究院，秘書處改設於瑞士聯邦技術學院(Eidgenössische Technische Hochschule，ＥＴＨ)之景氣研究所(Konjunkturforschungsstelle，ＫＯＦ，Swiss Institute for Business Cycle Research)，所長Dr. Bernd Schips擔任會長。2006年9月，Schips會長退休，執行委員會選舉ETH及KOF新任所長Jan-Egbert Sturm獲擔任新會長。ＣＩＲＥＴ現依比利時法律，設籍於布魯塞爾。

ＣＩＲＥＴ每年舉行一次大會，兩年舉辦一次大型國際研討會。本會經濟研究處自 1983 年加入ＣＩＲＥＴ爲團體會員。1985 年李前副主任委員高朝以會員代表身份首次參加ＣＩＲＥＴ第 17 屆研討會，其後各屆會議本會多派員出席，並曾於 2002 年負責主辦第 26 屆研討會。

ＣＩＲＥＴ組織運作、行政、重要工作係由執行委員會（Council）負責，經建會前經濟研究處處長葉明峯、胡仲英分別於 2000-2003 年及 2003-2005 年擔任執行委員會委員。2006 年 11 月 15 日布魯塞爾ＣＩＲＥＴ會員大會暨執行委員會通過葉副主委明峯當選執行委員。

ＣＩＲＥＴ會員包括各國政府負責調查、經濟統計分析機構（如中央銀行、統計局）、金融機構、商工業總會，各國經濟智庫及教育機構、以及國際經貿組織（如 OECD）、跨國機構（如歐盟經濟暨財政事務總署、歐洲中央銀行），且ＣＩＲＥＴ在經濟趨勢調查研究領域居國際領導地位，本會因此得以透過參與ＣＩＲＥＴ與各國政府部門互動並獲邀出席 OECD 會議。

二、 慕尼黑生物科技園區及 TVM 創投公司

慕尼黑生物科技園區成立於 1996 年，10 年以來園區新增將近 100 家中小企業，已成爲歐洲重要高科技生物科技製藥育成中心；德國 TVM 創投公司成立於 1983 年，係開發基金投資之一。

三、 出席會議目的

2007 年ＣＩＲＥＴ會員大會暨執行委員會於 10 月 18 日在德國慕尼黑 Ifo 研究院舉行，會議次二日（2007 年 10 月 19-20 日），Ifo 研究院企業調查所舉辦第二屆 Ifo 經濟調查資料方法與應用研討會，討論有關調查資料研究及在經濟方面的應用研究。爲掌握經濟趨勢調查發展、汲取最新研究方法與技術，並積極參與國際經貿事務，經建會葉副主任委員明峯率經濟研究處秦專門委員羽翔代表出席ＣＩＲＥＴ與 OECD 相關會議。會後亦參觀慕尼黑生物科技園區汲取德國發展生物科技園區經驗，並訪問 TVM 創投公司以了解其發展。

貳、會議過程

一、 ＣＩＲＥＴ執行委員會會議

2007 年 10 月 18 日晚間 7 時ＣＩＲＥＴ執行委員會會議於德國慕尼黑 Ifo 研究院召開，由ＣＩＲＥＴ會長 Jan-Egbert Sturm 主持，出席委員包括副會長 Ifo 研究院 Gernot Nerb 博士、法國統計經濟研究院(National Institute for Statistics and Economic Studies, INSEE）Hélène Erkel-Rousse 女士、Ifo 研究院駐日本 Jens-Uwe Jungnickel 先生、德國來比錫大學 Ullrich Heileman 教授、芬蘭產業總會經濟政策處長 Jussi Mustonen 先生、德國達姆施塔特工業大學 Günter Poser 教授、匈牙利經濟研究院（GKI）院長 András Vértes 先生、經建會葉副主任委員明峯、ＣＩＲＥＴ財務委員 Katharina Bloch 女士。列席者包括ＣＩＲＥＴ資訊中心 Daniel Bloesch 先生、29 屆研討會共同主辦單位巴西 Getulio Vargas 基金（Fundaçao Getulio Vargas, FGV）經濟學院（IBRE）副院長 Vagner Laerte Ardeo、及經建會秦羽翔專門委員等。

本次會議除通過 2006 年 9 月 21 日於羅馬舉行之執行委員會會議紀錄，主要討論要點如下：

(一) 29 屆研討會辦理情形：

1. 會議由巴西極富聲望的智庫 Getulio Vargas 基金（FGV）及聯合國拉丁美洲及加勒比海經濟委員會（The Economic Commission for Latin America and the Caribbean of the United Nations, ECLAC）聯合主辦。
2. 會議日期訂於 2008 年 10 月 8-11 日舉行，地點爲位於智利聖地牙哥之 ECLAC 辦公大樓。
3. 會議主題爲「企業趨勢調查與政策規劃」，專題爲「拉丁美洲之經濟趨勢調查」。
4. Isaac Kerstenetzky 獎（Isaac Kerstenetzky Award）：係 FGV 爲紀念首先建立巴西企業趨勢調查的前巴西國家地理及統計局（Brazilian Institute of Geography and Statistics，IBGE）局長 Isaac Kerstenetzky 而設立。該獎將頒發給本屆研討會拉丁美洲論文中之最佳兩篇（其中一篇來自巴西）各美金 5000 元。凡是經ＣＩＲＥＴ執行委員會通過且在研討會發表之論文均可免費加入此競賽。
5. 論文徵稿：研討會目的在齊聚學者與實務專家於一堂，就經濟調查、調查分析以及景氣循環指標議題討論，以促進彼此意見交流、經驗交換及合作。主要研討議題包括企業趨勢調查、消費者調查、投資與創新調查、

景氣循環指標之應用開發。另外，「拉丁美洲的經濟調查」專題徵求拉美地區調查統計應用與方法方面的論文。調查統計應用方面的議題包括：景氣循環分析與各國景氣循環同步、短期預測與政策分析及預期模型；方法方面的議題包括：樣本與調查設計及其對回收率之影響；移動性節日及季節調整；去除趨勢、平滑化及結構改變期間循環日期的認定；綜合指數的建立及資料修正之影響。

(二) 其他

1. ＣＩＲＥＴ與 OECD 聯合出版學術期刊 Journal of Business Cycle Measurement and Analysis（JBCMA）自 2006 年 9 月以來已登錄於美國經濟學會（AEA）電子索引，包括電子版經濟文獻期刊（Journal of Economic Literature）及電子書目（EconLit）。
2. 第 30 屆研討會：目前正在探詢評估會員主辦意願。
3. 會員變動：2007 年新進 2 個團體會員及 3 個個人會員；同時，5 個團體會員及 7 個個人會員退出。截至 2007 年 10 月，在籍團體會員爲 29 個，個人會員 44 員。

二、 ＣＩＲＥＴ會員大會

10 月 18 日晚間 7 時 45 分ＣＩＲＥＴ會員大會於德國慕尼黑 Ifo 研究院召開，由ＣＩＲＥＴ會長 Jan-Egbert Sturm 主持，出席者除執行委員會委員外，尚有其他會員出席。

本次會議除通過 2006 年 9 月 21 日於羅馬舉行之會員大會會議紀錄、2006 年財務稽核報告與 2007 年會計報告、2008 年預算計畫外，亦聽取執行委員會報告，並討論 29 屆研討會籌備情形。討論要點如下：

(一) 執行委員選舉

1. 比利時中央銀行統計處長 Keam-Jacques Vanhaelen 退休，大會通過其繼任者 Rudi Acx 爲執行委員。
2. 巴西 Getulio Vargas 基金經濟學院（IBRE）副院長 Vagner Laerte Ardeo 因擔任第 29 屆研討會主辦國經理，大會通過其爲臨時執行委員。
3. 萊比錫大學 Ullrich Heileman 教授 4 年任期至 2007 年，大會通過其繼續擔任執行委員，新任期由 2008 年開始。

(二) 執行委員名額

ＣＩＲＥＴ組織法規定執行委員會委員人數不得超過 20，目前名單則有 22 名。但因 INSEE 二位委員 Hélène Erkel-Rousse 女士及 Philippe Scherrer 先生將輪流代表該機構使用其投票權，因此僅相當於一名委員。另，依組織

法 27 條，前任會長可參與執行委員會行使投票權，因此上任會長 Bernd Schips 名額不受此限。

三、 Ifo 經濟調查資料方法與應用研討會

10 月 19-20 日，Ifo 研究院企業調查研究所於慕尼黑主辦調查資料研討會，計有來自瑞士、比利時、瑞典、芬蘭、匈牙利、西班牙、印尼、奧地利等經濟研究機構 40 位學者專家及ＣＩＲＥＴ會員出席。

各場次討論主題爲：調查方法、調查與貨幣政策、調查與景氣循環、調查與銀行行爲、調查與物價上漲預期、調查與經濟行爲調整、總體經濟預測、屬質與屬量調查及跨國研究。可供我國景氣與經濟政策分析借鏡之論文說明如下：

(一) 屬質與屬量調查比較

瑞士 KOF 研究院 Rolf Schenker 以 2 種瑞士投資調查比較屬質與屬量調查，結果發現計畫增加（或減少）投資的廠商變動平均值爲正（或爲負），而在屬質調查中，投資決策不變的廠商的變動平均值近於零。Carlson 及 Parkin(1975)假設屬量觀察值的分配爲常態，其他已有研究則假設其他型態分配，但是本研究指出，廠商資料既非常態分配也不是邏輯分配。

作者另外採 Ronning(1984)提出的回覆函數（response function），算出給予某種屬質答案的廠商比例，結果顯示，量的變動幅度愈大，愈多廠商給予正面回答；反之，量的變動幅度愈小，愈多廠商給予負面回答。（論文題目"What did you Say?" comparing qualitative and quantitative survey data"）

(二) 歐洲消費者物價上漲預期跨國研究

波蘭中央銀行總體經濟研究局學者 Thomasz Lyziak 及 Ewa Stanisławska 發展一套消費者預期調查結果的評估。評估的調查包括以屬質結果爲基礎算出屬量的機率、屬量的調查結果、屬質調查結果分配。評估的項目包括預測準確度、物價上漲預期與未來物價上漲的因果關係、預期物價上漲率與未來實際上漲率在長期間合一（convergence）的趨勢。歐洲資料顯示其屬量結果對物價上漲的預測能力相當不好，但是，與未來物價上漲的確存在統計因果關係，且多數的測量結果在長期間與理性預期結果

相符合。（論文題目"Consumer Inflation Expectations in Europe: Some Cross-country Comparisons"）

(三) 多面向綜合指標是否可改善 GDP 領先指標

瑞士景氣循環研究所 KOF 學者 Michael Graff 合成 22 項時間數列而編製一個多部門（multi-sectoral）指標，以 1990-2002 爲樣本期間，並有 14 個樣本外觀察值，然後與 KOF 舊指標比較。多面向（multi-dimensional）指標係先就個別部門編製主要成分（principal component）指標，再聚合多個部門指標而成綜合景氣循環指標。舊指標爲單一面向（one-dimensional）指標，係採用理論上具意義且實證上具領先性的指標，包括三項製造業調查指標（訂單、未交貨訂單及預期中間財購買）及三項季資料指標（躉售存貨判斷、建築業未交貨訂單與上年比較、消費者對未來 12 個月金融業判斷）。結果顯示，多部門綜合指標表現較單一部門指標好，不過準確度尚待改進。（論文題目"Can a Multi-sectoral Design Improve Indicator-based Forecasts of the GDP Growth Rate? Evidence from Switzerland"）

(四) 評估 Ifo 世界經濟氣候指標的預測特性

Ifo 研究院學者 Oliver Hülsewig, Johannes Mayr, Stéphane Sorbe 指出，爲能即時掌握景氣動向，除以屬量景氣循環指標（如：工業生產、信心調查、綜合指標）預測近期 GDP 成長率外，亦有以屬質景氣循環指標預測景氣，包括：歐盟執委會編製的經濟信心指標、OECD 編製的領先指標、經濟政策研究中心（Centre for Economic Policy Research, CEPR）編製的歐元同時指標及 Ifo 世界經濟調查（World Economic Survey, WES）的經濟氣候（CESifo Economic Climate）指標。WES 調查結果係經濟專家對經濟現況的判斷，而且在當季就可以發布對當季的判斷而沒有落後，但是 WES 結果無法因新的月資料發布時更新。以 2001 第 1 季至 2006 第 3 季爲預測區間，比較 WES 與其他指標對下一季的預測誤差，結果顯示 WES 預測方向與準確度較佳。（論文題目"Assessing the Forecast Properties of the CESifo World Economic Climate Indicator: Evidence from the Euro Area"）

四、 參訪慕尼黑生物科技園區

(一) 慕尼黑生物科技園區設立與現況

慕尼黑於 1996 年 11 月贏得德國聯邦教育與研究部 BioRegio Competition 提供 5000 萬馬克 BioRegio 基金而成立生物科技區。園區成立 10 年以來，

雖已由最初三年（1997-1999）的倍數成長轉緩爲 80%的成長率，其間的研究機構 Max Planck Institutes、慕尼黑大學、GSF 國家研究中心仍然持續擴張，育成中心生物科技創新與新創企業中心（Innovation and Startup Center for Biotechnology， IZB）也數度擴建爲 15,000 平方公尺區域並充分利用(利用率達 90%)。目前園區有 30 種在國際試驗階段的候選藥物，70 種在不同的臨床實驗藥階段。

2006 年，園區的資金週轉爲 2.6 億歐元，有半數在慕尼黑註冊的生物科技中小企業位於園區。園區公司有 180 家，包括藥廠、生技集團分公司、研發與技術委辦服務公司、中小企業，就業人口達 14000 人。其中，中小企業 96 家雇用 2400 人。周圍生命科學研究機構就業人口達 9000 人。園區內某些公司已完成上市，並離開園區而成爲獨立的中型企業。

(二) 慕尼黑生物科技園區學術環境

慕尼黑地區擁有 GSF 國家環境與健康研究中心、國家級 Max-Planck-Institut 之生物化學、神經生物學與精神病學等 3 家研究院、Großhardern 大型醫院區、2 所大學（慕尼黑大學與工科大學）、 2 所大學附屬教學醫院、2 所運用科技學院（Fachhochschule München 與 Weihenstephan）。

另外，慕尼黑大學已持續將校園由慕尼黑市區移至園區（車程約半小時），化學、製藥、生物及動物學的研究醫療團隊在此亦有悠久歷史。園區慕尼黑大學生技醫藥中心 亦贏得卓越研究獎。未來幾年，巴伐利亞邦亦將在園區設立教學研究中心。

科技研究機構環繞園區

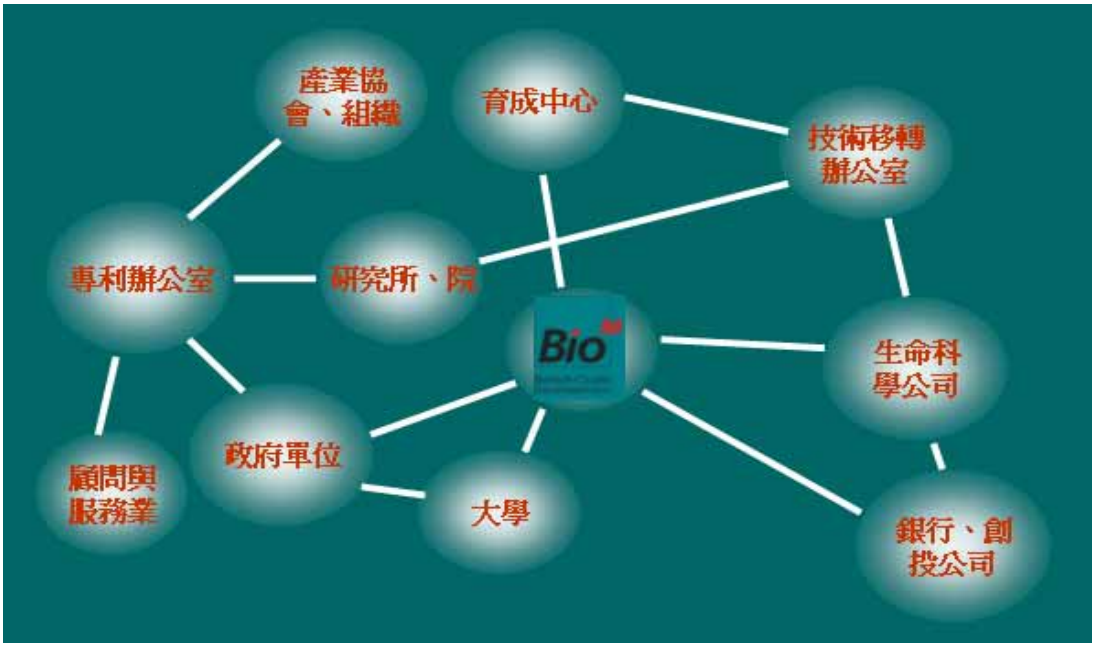
資料來源：
http://www.izb-online.de/english_martinsried/cluster.php?sessionid=Oktegkgyc6nObeZRAB8512018341417hFXeGevs7ktE469S96i&lang=。

(三) 園區組織

1. 園區企業經營服務－ BioM 角色

BioM 爲一個服務與顧問公司，係當初規劃園區成立項目之一，於 1997 年 5 月成立，負責協調該區產業發展，使慕尼黑園區能穩坐歐洲生物科技中心的領導地位。BioM 自稱爲 the network agency，擔任慕尼黑地區之生技網絡中心，協調慕尼黑生物科技聚落的活動，專職該區生技相關事務之溝通與協調，扮演生命科學業者與新創事業第一個接觸的窗口，協助業者在公司營運的各階段找到最適合的夥伴。

BioM 負責連結園區各方面活動與成員，建立強力網路



資料來源：BioM 2006 年報。

BioM 主要業務爲：提供生技產業資訊與相關諮詢服務、建立聯絡資訊網(databank)、提供公關及媒體服務、提供財務諮詢、策略與經營管理顧問服務、並管理生技產業投資基金、協調與聯繫各有關單位等。

BioM 主要業務

資料來源：BioM。

2. 園區育成中心－ IZB

IZB(Innovation and Startup Center for Biotechnology)生物科技創新與新創企業中心係由巴伐利亞省、當地城市政府(Planegg、 Freising) 、慕尼黑市政單位合夥經營。IZB 公司負責園區的基礎建設與管理，提供有關地點選擇與企業基本設施及其他各類咨詢服務，協助籌措建築貸款，協助中小型生技公司之創建與完成產品之市場化。

IZB 以優惠價出租裝潢過的辦公室、實驗室、儲藏室、遊憩區、會議室等場地，提供不同等級的實驗室，待新創企業成長後就可移出育成中心而獨立 。後來又設立育幼園，引進連鎖餐廳與外燴公司。2004 年承租廠商有 42 家，承租人包括：已成立的新創公司、生技服務廠商、新設新創公司、以及少數國際公司。爲提昇園區的進步與合作，IZB 注意維持承租廠商最好的組合比例。

(四) 進駐園區企業概況

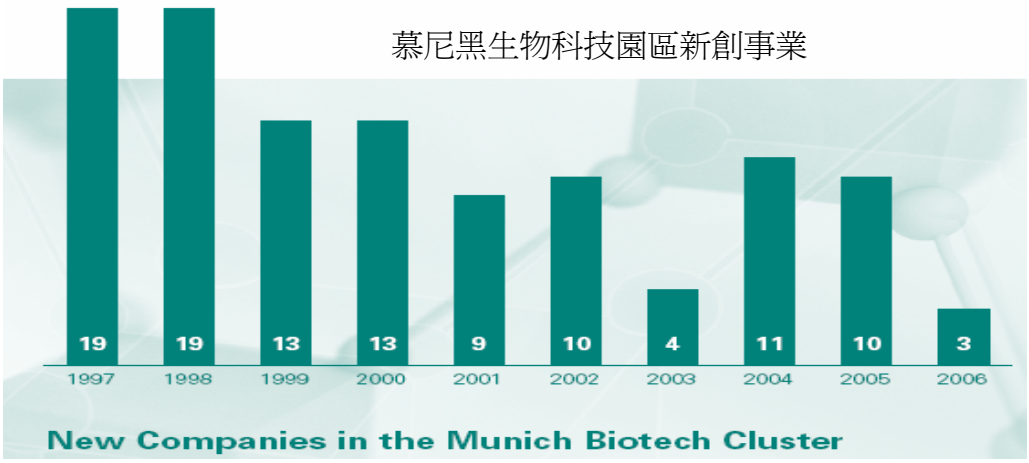
1. 企業結構

2006 年慕尼黑生物科技園區共有 180 間企業，其中 97 家爲中小企業，35 家爲研發與技術委辦服務公司（CROs），18 家爲國際製藥集團，29 爲生技製藥集團之分公司。

97 家中小企業中，從事治療性藥品研製及醫療診斷鑑定方式者占 43%（42 間）；研製生技器材與試劑者占 27%（26 間）；其餘爲生技公司。生技公司之研發方向則分屬 DNA-蛋白質分析（11 間）、臨床實驗發展（5 間）、生物資訊工程（6 間）、農業化學、營養及環境（7 間）等。DNA-蛋白質分析、臨床實驗發展、生物資訊工程、生技器材與試劑等屬生技服務公司，約占 50%。

2. 園區成立以來新創企業成長

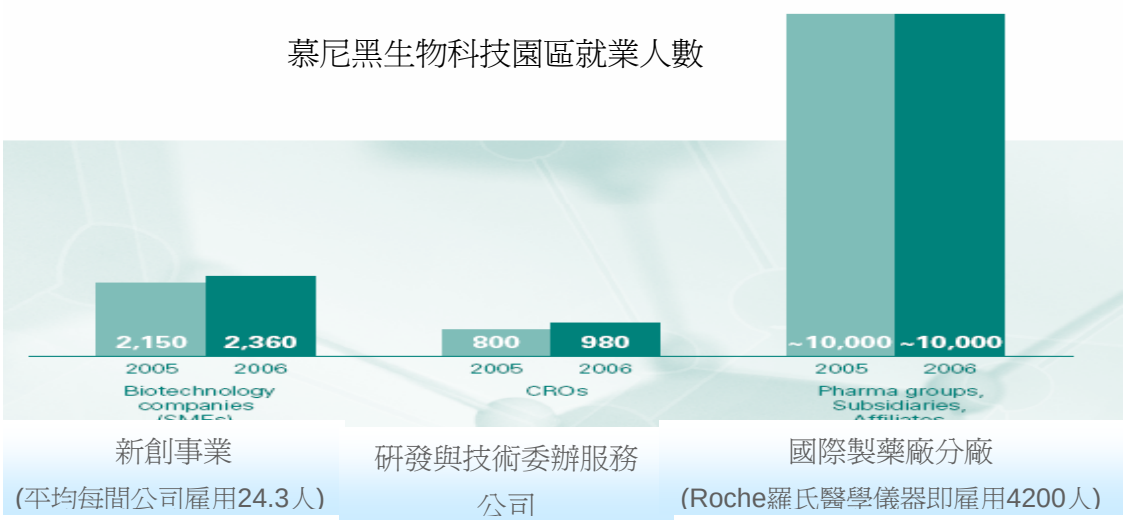
園區剛成立幾年新創企業增加快速，近幾年來則趨緩。2006 年新增的 3 家新創企業均係由研究團隊產生，一家爲慕尼黑大學衍生（spin off），一爲慕尼黑大學醫院衍生，一爲 Würzburg 及 Tübingen 大學衍生。其中兩家資金來自外部投資人，另一家資金來自德國高科技投資基金 HighTech-Gruenderfonds （係由德國聯邦政府、銀行集團及產業聯合投入 272 million 歐元 ）。



資料來源：BioM 2006 年報。

3. 園區就業人口

園區公司有 180 家，包括藥廠、生技集團分公司、研發與技術委辦服務公司、中小企業，就業人口達 14000 人。其中，中小企業 96 家雇用 2400 人。周圍生命科學研究機構就業人口達 9000 人。新創事業就業者中，有一半以上有大學以上學位，1/4 爲受過訓練的技術助理。9000 生命科學研究人口中，5500 人具博士學位或正在攻讀中。

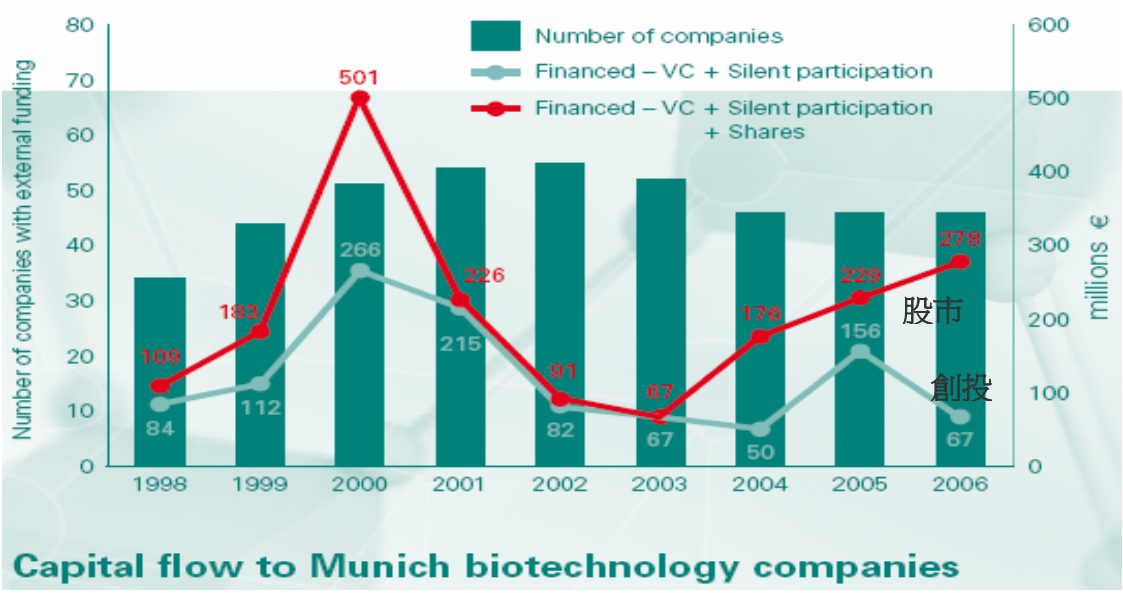


資料來源：BioM 2006 年報。

4. 園區籌募資金概況

2006 年園區募集的資金占全國生技創業投資三分之一，其中創投募集 0.7 億歐元，股市募集 2.8 意歐元

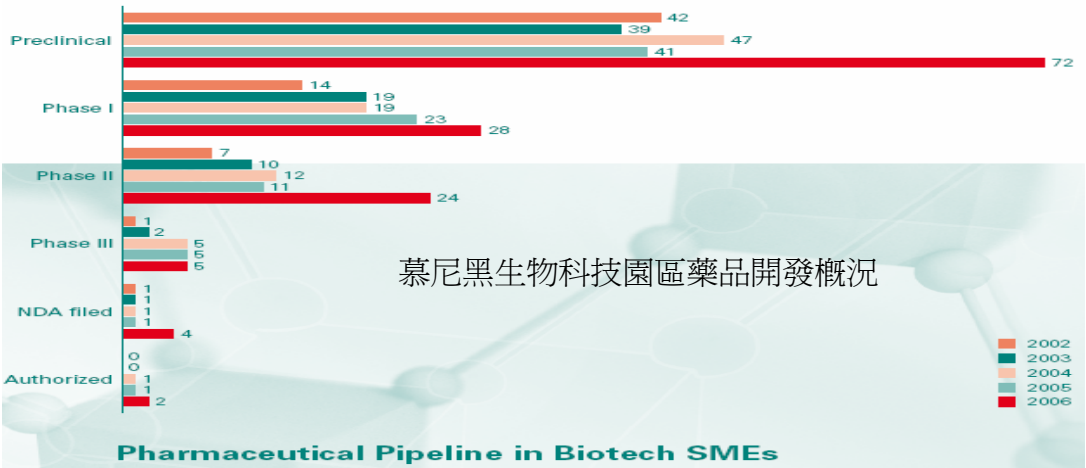
慕尼黑生物科技園區資金籌募概況



資料來源：BioM 2006 年報。

(五) 園區產品發展概況

新藥開發各階段（pipeline），從發現、試驗…註冊、到許可上市，不斷有新產品進階加入，顯示園區愈趨成熟。園區 130 種臨床前與臨床試驗案子當中，有 100 種產品、19 種候選藥物已進入臨床第 2－3 期試驗階段、3 種產品已進入許可階段，2 種產品已經上市。



慕尼黑生物科技園區藥品開發概況

資料來源：BioM 2006 年報。

(六) 慕尼黑生技園區成功因素

1. 設計文化與生活環境：根據 BioM 分析，大環境方面，德國是一個講究設計的國家，具備設計的文化環境，而慕尼黑有豐富的文化活動（美術展、音樂會、古蹟、科技博物館、工藝、飲食等）、便利的商業服務及各類休閒運動生活（阿爾卑斯山滑雪、黑森林登山、湖區游泳自行車、西南歐陽光度假），提供吸引人的生活環境。

2. 由下而上的科技基礎：慕尼黑具備優良科技研究環境，新創事業都是由研究團隊轉型。另外，製藥廠與生技學界合作成功，形成優質聚落。

3. 完善的基礎建置：除了硬體建設之外，園區也發展成熟的軟體服務及營運網路，而近距離的便利優勢更有利企業的協力關係發展及聚落的穩定成長。

4. 豐沛融資來源：創投基金(慕尼黑爲德國創投中心)、企業天使、政府輔助金（省、聯邦、歐盟）、政府投入相對基金鼓勵大藥廠投資新創公司。

5. 高品質人力資源：9000 生命科學研究人口中，5500 人具博士學位或正在攻讀中。新創事業就業人口中，有一半以上有大學以上學位，1/4 爲受過訓練的技術助理。

6. 眾多創業成功示範。

7. 有專責協助技術移轉的機構，使研究成果可以成功完成商品化。

(七) 慕尼黑生技園區面臨問題

1. 新創事業增加趨緩：因此，園區需要透過令人鼓舞的範例，即「研究卓越又會賺錢的範例」，吸引學者與企業在學術象牙塔以外建立高科技企業。

2. 創投資金操作趨保守：早期創投資金會選擇新創或初期公司，最近則偏好已有成就的公司，研判係因近來新創公司都是以服務爲主，而不夠創新，較難吸引創投公司。

五、 參訪德國 TVM 創投公司

(一) 籌設歷史

德國 TVM 創投公司籌設於 1983 年，並於 1986 年成立美國波士頓辦公室，是德國歷史最悠久的創投公司之一。在其曾參與轉投資的公司當中，已有 50 家公司於美國 NASDAQ、英國 London Stock Exchange、德國 Frankfurt Stock Exchange，及瑞士證交所順利掛牌交易。目前該公司共有 30 個跨洲投資，分散於 8 個國家。

(二) 經營團隊

TVM 目前有 11 位生物科技領域合夥人、7 位資訊科技領域合夥人、8 位公司財務領域合夥人。2007 年 6 月，董事合夥人 Dr. Helmut Schühsler 獲選擔任 2007 年 6 月-2008 年 6 月歐洲私募股權基金及創業投資事業協會（European Private Equity and Venture Capital Association (EVCA)) 理事主席， 負責領導全歐洲最受矚目的創業投資協會，並協助所有會員尋求成長機會。**Schühsler** 應允 **2008 年 EVCA** 西班牙馬德里大會將邀請我國參加。

(三) 經營概況

TVM 總管理基金規模約達 13 億歐元，管理投資分跨生命科學(life science）與科技（technology ）兩個領域。若以 96 年 6 月底之投資案評價而言，全體基金之未實現投資跌價損失約爲 0.4 億歐元。生物科技投資方面，至 2007 年 8 月 31 日，轉投資歐洲公司 21 家，其中 11 家已上市交易；美國公司 18 家，其中 6 家已上市交易。

生物投資案當中，34%投資於歐元區，29%投資於美元區，其他地區占 37%。資訊投資案中，33%投資於歐元區，26%投資於美元區，其他地區占 41%。

(四) 基金規模

基金名稱	成立時間	產業領域	代表性公司	基金規模
TVM I	1984 年	**生物醫療**	Qiagen	8,700 萬歐元
TVN II	1989 年	**資訊科技**	SCM Microsystems	9,200 萬歐元
TVM III	1997 年	**生物醫療**	MorphoSys	9,300 萬歐元
TVM Medical	1998 年	**生物醫療**	Idenix	9,300 萬歐元
TVM IV	2000 年	**資訊科技**	Traveltainment	30,000 萬歐元
TVM V-BI	2001 年	**生物醫療**	Sirna	33,600 萬歐元
TVM V-IT	2002 年	**資訊科技**	Revolt	20,800 萬歐元

基金名稱	成立時間	產業領域	代表性公司	基金規模
TVM VI	2005 年	**生物醫療**	Newron	24,000 萬歐元
			合計承諾金額	**14.49 億歐元**

資料來源：TVM。

(五) 營運績效

截至 2007 年 6 月 30 日				Unrealised Return				單位：百萬歐元
Fund	Vintage	Invested Capital	Realised Return	Publicly traded	Privately held	Multiple	Gross IRR	Net IRR
TVM II	1989	20,9	86,3	-	-	4,1	32%	N/A
TVM III	1997	33,9	140,4	3,5	-	4,3	64%	45%
TVM MV	1998	62,7	46,9	17,8	6,1	1,1	2%	-1%
TVM IV	2000	144,2	29,1	34,1	23,5	0,6	-5%	-15%
TVM V LS	2001	266,8	53,2	148,4	63,6	1,0	0%	-5%
Fund	Vintage	Invested Capital	Realised Return	Publicly traded	Privately held	Multiple	Gross IRR	Net IRR
Total		**586,2**	**356,4**	**226,1**	**130,4**	**1,2**	**5%**	**N/A**

資料來源：TVM。

(六) 轉投資公司與亞洲合作

轉投資公司中約有 50%與亞洲區有業務合作關係，包括臨床前/臨床服務、合約服務、技術轉化商品合作、創投、製藥企業投資。主要合作方式在藥物研究開發、臨床發展、藥物許可申請、共同投資、行銷、客戶服務、設立代表處等方面。合作對象包括日本（ 15 家）、中國（6 家）、新加坡（4 家）、 台灣（3 家） 、印度（3 家）、澳洲（1 家）、韓國（1 家）、馬來西亞（1 家）。在台灣，則分別與統一生命科技（ President）生華科技創投（CDIB）共同投資。

(七) 市場趨勢與 TVM 創投策略

1. 全球市場移轉

TVM 分析，全球快速成長的市場，已由成熟市場、小分子產品、主要照顧等轉爲新興市場、生物科技、腫瘤、學名藥等市場。另外，亞太地區科技人才正逐步追趕歐美地區，因此將在藥品開發服務、診斷、器材製造等領域瞄準成長快速市場，必加速公司本身與轉投資公司加速全球化，以提升資本效率。

2. 歐盟地區資金募集趨難

由於私募基金（Private Equity）及融資收購機構（Buy Out Houses）具快速回收能力及高度流動性，致使傳統創投基金面臨高競爭壓力。不過，此二種管道的融資收購交易風險可能被低估，且將影響其未來投資績效。雖然歐盟區創投公司籌資環境較以往困難，惟績效良好的績優基金不但未受影響，反而更受歡迎，因此基金的募集規模更加兩極化或集中化。此外，大型北美投資法人認爲歐盟區創投基金尚具高度發展潛力，且由於美國實施沙賓法案（Sarbanes-Oxley），因此在投資新興公開發行公司業務上歐盟創投基金較北美創投基金有利。

3. 由於參與交易的專業投資法人增加，歐盟 IPO 市場呈低溢價趨勢，迫使創投基金持有期間延長，投資組合的價值變化大並易受空頭市場影響，因此創投公司之淨資產價值波動率遠高於其他私募基金。

4. 創投主管機關及外部媒體機構對透明度要求上升，預期未來將有創投產業自律公約產生

5. 展望未來，亞洲區因有萌芽階段及後期公司，發展機會上升。特別是 TVM 將透過開發基金等亞洲區重要，善用台灣的創新實力、高品質出口及與東亞的密切關係，發展生命科學業務。美國與歐盟的投資案源橫跨早期到晚期各階段，且案件數眾多，因此，未來仍有充分機會。特別在美國東岸，處於萌芽階段的優質企業新案，將源源不絕產生。

(八) TVM 轉投資公司

本次參訪慕尼黑生技園區及 TVM 創投同時亦與 TVM 創投知轉投資公司會談，包括 Wilex、VPM、Medigene、，其中 VPM 爲疫苗專案計畫管理公司，本身並沒有自己的實驗室，主要業務爲找出具潛力的疫苗與候選藥物，進而取得智慧財產權，接著設計產品增加其附加價值、委託技術委辦服務公司開發產品、吸收潛在合作夥伴，最後取得許可執照上市。該公司由兩間非營利機構－德國疫苗基金會及感染研究基金會的發展基金（前身爲德國生物科技研究中心）資助成立，目前由聯邦教育暨研究部補助 25.6 百萬

歐元，正在尋找產業與財務夥伴而能財務獨立。該公司接手學術研究成果進行商業化經營直至交付製藥廠量產，其執行長 Albrecht Läufer 博士表示，德國並沒有其他性質相同的公司，在美國可能有。

參、心得與建議

一.應繼續積極參與ＣＩＲＥＴ及相關組織會議

由於ＣＩＲＥＴ爲國際經濟趨勢研究之重鎮，OECD 與歐盟均重視與其合作，經建會因積極參與ＣＩＲＥＴ，而受邀參與 OECD 與歐盟有關企業與消費者調查及景氣指標編制之相關會議。透過此平台與國際同一領域之精英互相切磋，可改進我國趨勢調查及預測效能，經建會因而有機會與 OECD 統計局、德國 IFO 研究院專家交流，汲取編製景氣指標新方法，並據以修訂 96 年 7 月起起用之台灣領先指標、同時指標及景氣對策信號系統。因此，經建會等相關單位應積極參與，保持此一管道交流暢通。

二.創新的文化爲生物科技園區的搖籃

選擇科技園區的地點需考量的條件包括：科技學術環境及科技基礎、技術移轉的機制、實體環境設施、相關法律架構、產業聚落、企業營運服務、人員組織、創業先進借鏡與典範、資金與退場機制、生活環境。

生物科技園區除了必須具備大學、醫院、研究機構等科技學術環境及科技基礎，能夠激勵研究者移轉技術且便利其移轉的機制也非常重要。同時，實體環境設施與相關法律架構爲不可或缺，產業上、中、下游形成業界彼此間互助互補的生產組織與網路，並行之有年，加上相關企業營運服務及行銷的網路，可使科技公司無須擔憂技術開發成功之後的商品化問題，節省經營成本。當然，合適的人事組織與充沛的資金也是成功要素。最後，建立退場機制並提供創業典範鼓勵進場，可使市場活化。而良好的生活環境，則可吸引優質人力進駐。

由於我國已具備優良醫療人力培育制度，而區域性的特殊物種與疾病研究亦已建立基礎，加以全球領先地位的資訊科技應用可與生技產業密切結合，創造我國生技產業發展之利基。因此，可善用既有優勢，掌握先機，結合政府與民間力量，及時共同努力發展生物技術產業。檢視台北南港生物科技園區或新竹醫學科技園區，已具備研究傳統且具有深度與廣度之研究基礎、實體環境設施、相關法律架構、企業營運服務、及優秀的人員組織與資金，尚可強化移轉機制的吸引力、成功的創業典範、上中下游產業聚落、及退場機制。優質的生活環境則需整體努力。

三.我國產業經貿園區推廣可參考德國生物科技園區

BioM 扮演生命科學業者與新創事業第一個接觸的窗口，協助業者在公司營運的各階段找到最適合的夥伴，提供生技產業資訊與相關諮詢顧問服

務、建立聯絡資訊網(databank)、提供公關及媒體服務、提供財務諮詢、策略與經營管理顧問服務、並管理生技產業投資基金、協調與聯繫各有關單位等。BioM 網站提供各種園區經營所需接觸機構的連結入口，並提供技術移轉、各種輔導基金、融資方案的簡單說明及網路連結。網站的公佈欄甚至提供公寓出租的訊息。其設計針對業者在園區創業的第一步開始所面臨的各種疑問與步驟，大幅減低創業難度，直得我國推動各類產業園區或經貿特區參考。

四.專案計畫管理公司創造附加價值，經營上市

生物技術與醫藥產業因技術密集度高，從事學術與研究人員對於市場與商業活動有很大的隔閡，不善於也不熟悉如何轉化研究成果爲商業利潤，因此徒有優異研究成果，卻難以獲得產業市場青睞。專案計畫管理公司（如德國 VPM 公司）可在此發揮其銜接功能，因爲具有企業經營能力，能夠連結醫學、研究與產業市場，挑選學術研究成果，設計加值，負責醫藥上市前各種檢驗、法律程序、融資等問題，再轉手給製藥廠量產。此種模式可作爲發展高科技產業選項之一。

肆、附件

一、 ＣＩＲＥＴ執行委員會議程文件

(一) 2007 年 10 月ＣＩＲＥＴ執行委員會議程

ETH
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Swiss Federal Institute of Technology Zurich

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Zurich, September 18, 2007

CIRET

Council Meeting

Thursday, 18 October, 2007, 19:00

Ifo Institute for Economic Research
Poschingerstrasse 5, DE-81631 Munich
(Tel. 0049 89 9224 1229)

Agenda

1. Adoption of the Agenda
2. Adoption of the Minutes of the last Council Meeting of 21 September, 2006, in Rome
3. 29th CIRET Conference of October 8 – 11, 2008: Adoption of Call for Papers
4. OECD-CIRET Journal «Journal of Business Cycle Measurement and Analysis»: Prospects
5. 29th CIRET Conference 2008 in Santiago de Chile: Actual state of preparations, plenary sessions, chairmen of the parallel sessions
6. 30th CIRET Conference 2010
7. General Assembly Meeting
8. Varia
   a. Determination of Membership Dues 2008 (according to art. 17 of the statutes)
   b. Admission of new Individual and Corporate members (according to art. 17. of the statutes)

(二) 2006 年 9 月ＣＩＲＥＴ執行委員會會議記錄

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CIRET-Office
c/o KOF
Konjunkturforschungsstelle
Swiss Institute for
Business Cycle Research

CIRET
KOF

Zurich, 18 October, 2006

DRAFT

Minutes
CIRET Council Meeting
21 September, 2006

ISAE Institute for Studies and Economic Analyses, Rome

Members present	Mrs. Hélène **Erkel-Rousse**, Prof. Bernd **Schips** (President), Dr. Gernot **Nerb** (Vice-President), Prof. Ullrich **Heilemann**, Mr. Jens-Uwe **Jungnickel**, Mr. Franz-Josef **Klein**, Mr. Marco **Malgarini**, Mr. Jussi **Mustonen**, Mr. Ronny **Nilsson**, Prof. Karl-Heinz **Oppenlaender**, Prof. Guenter **Poser**, Mr. Philippe **Scherrer**
Guests	Mr. Vagner **Ardeo**, Vice-President of the Brazilian Institute of Economics, Getulio Vargas Foundation (FGV), Rio de Janeiro Mr. Aloisio **Campelo**, Coordinator of the Tendency Surveys from FGV, Rio de Janeiro, Ms. Regina **Chyn,** CEPD, Taipei, Mr. László **Mólnar**, GKI Economic Research Co., Budapest, Mr. Giuseppe **Parigi**, Bank of Italy, Rome, Prof. Jan-Egbert **Sturm**, KOF Swiss Inst. for Business Cycle Research, Zurich
CIRET-IDC	Dr. Daniel **Bloesch**
Secretary	Ms. Katharina **Bloch**
Excused	Mr. Paolo **Carnazza**, Dr. Zbigniew **Matkowski**, Prof. Ichiro **Shirakawa**, Mr. Ari **Tyrkko**, Mr. Jean-Jacques **Vanhaelen**, Dr. Andras **Vértes**, Mr. Thomas M. F. **Yeh**

Agenda

1. Adoption of the Agenda
2. Adoption of the Minutes of the last Council Meeting of March 23, 2006 in Rome
3. Elections (President)
4. Report on the OECD-CIRET Journal «Journal of Business Cycle measurement and Analysis»
5. Venue and Organisation of the 29th CIRET Conference 2008
6. Varia
   - Determination of Membership Dues 2007
   - Admission of new Individual and Corporate Members

Nr.	Item	Remarks
1	Adoption of the agenda	The agenda is adopted.
2	Adoption of the Minutes of the last Council meeting of 23 March, 2006, in Rome	The minutes of the last meeting are adopted.
3	**Elections (President)**	**Prof. Dr. Jan-Egbert Sturm**, Head of KOF Swiss Institute for Business Cycle Research is elected unanimously as successor of **Prof. Dr. Bernd Schips.**

4	Report on the OECD-CIRET Journal «Journal of Business Cycle Measurement and Analysis»	There are substantial delays in the publication agenda due to a missing stock of ready-to-publish papers and due to delays in the referee process of some papers. Vol. 2, No. 3 has been published in April 2006. **Two issues** of Vol. 3 should be published **before end of 2007**. Since September 2006, the JBCMA has been **listed in the AEA** electronic indexes, which are included in JEL on CD, e-JEL and EconLit. This should help to attract good papers. Some papers presented at the Conference had been submitted for publication in the JBCMA. The question of the copyrights for translated publications is raised. In the journal, original papers only should be published. An English translation of a paper might be published as «Report».
5	Venue and Organisation of the **29th CIRET Conference 2008**	The **29th CIRET Conference 2008** will take place in September or October 2008 in **Santiago de Chile**.
6	Varia - Determination of **Membership Dues 2007** - Admission of **new Individual and Corporate Members** - Next meetings	- The amount of membership dues 2007 is **maintained** at EUR 800 for Corporate members and at EUR 80 for Individual members. - The Council admits the institutions and personalities according to the submitted list. - The next **Council meeting** will take place in **March 2007** in **Zurich** (preparation of 29th Conference, topics, invited lectures). A further meeting is planned in **October or November in Munich** (just before the ifo Symposium yet to be fixed). In order to discuss and decide about paper proposals (so far called «abstracts»), another meeting will take place in **March 2008** (place to be fixed).

President

Bernd Schips

Secretary

Katharina Bloch

(三) 29 屆ＣＩＲＥＴ研討會論文徵稿文稿

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CIRET Office
c/o
KOF Konjunkturforschungsstelle
KOF Swiss Economic Institute

Draft v1

29th CIRET Conference

Wed, October 8 – Sat, October 11, 2008, Santiago de Chile

Business Tendency Surveys and Policy Formulation

Special Topic
Economic Tendency Surveys in Latin America

Hosted by
ECLAC – United Nations Economic Commission for Latin America and the Caribbean
FGV – Fundação Getúlio Vargas of Brazil

Sponsored by
…

Call for Papers

The overall aim of CIRET conferences is to encourage and improve communication, exchange and co-operation between academics and practitioners who conduct economic surveys, analyse survey data and develop or make use of cyclical indicators. CIRET, the Centre for International Research on Economic Tendency Surveys, is also a forum for discussion and application of new methodological developments and their results.

This call invites papers related to a broad range of topics to be investigated based on several types of surveys (business tendency surveys, consumer surveys, investment and innovation surveys, etc.). The call also invites papers based on the development and use of cyclical indicators, including methodological aspects. Within this framework, all types of contributions are welcome.

Topics

I. Short-term Economic Surveys and Indicators

- Business Tendency Surveys (including Investment Surveys)
- Consumer Tendency Surveys
- Composite and Leading Indicators
- Ad hoc Surveys
- New Methods

II. Surveys Related to Structural Aspects of the Economy

- Innovative Activity
- Information and Communication Technology (ICT)
- Organisational Change
- Labour Market Analysis
- Public Knowledge about Statistical Data

III. Special Topic

♦ **Economic Tendency Surveys in Latin America**

The special topic invites papers focusing on uses of economic tendency survey data in the Latin American region as well as papers dealing with methodological aspects of economic tendency surveys which might be particular to the region.

Use of data aspects are:
- Business cycle analysis and cycle synchronisation across countries
- Short-term forecasting and policy analysis
- Modelling of expectations formation

Methodological aspects are:
- Sample and survey design and their impact on response rates
- Moveable holidays and seasonal adjustment
- Detrending, smoothing, and identification of cycles in the presence of structural breaks and possibly shorter and/or varying cycle durations
- Construction of composite indices and impact of data revisions

Submission Procedure

Abstracts

Deadline: End of February 2008

Please send your abstract by filling out the **form for abstracts** on:

http://www.ciret.org/callforpapers

The form asks for an abstract of 300-500 words, the title of the abstract and for keywords and JEL classification. In addition information about the novelty of the contribution, the data set and methods used and about the most relevant references is requested.

E-mails of acceptance will be sent to the corresponding author by end of March 2008.

The abstracts of the contributions accepted will be published on the CIRET Conference website in April 2008.

Papers

Deadline: End of June 2008

Please send your paper in MS-Word- or PDF-Format to:

papers@ciret.org

....

Additional information about the conference is available on the CIRET Conference web site:

http://www.ciret.org/conferences/santiago2008

Publications

Authors are kindly invited to submit their ready-to-publish papers to the joint OECD and CIRET Journal of Business Cycle Measurement and Analysis (JBCMA) (http://www.ciret.org/jbcma).

Submissions accepted by the Editor-in-Chief will be peer reviewed by two referees.

Contact

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(四) ＣＩＲＥＴ執行委員會委員任期

CIRET Council Members: Terms of Office

15.10.2007 - CIRET Office

Number of members:	14	17	18	19	19	20	20	21
Year	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Schips	President	President	President	President	President	President		
Sturm							President	President
Nerb	Vice-president	Vice-president	Vice-president	Vice-president	Vice-president	Vice-president	Vice-president	Vice-president
Carnazza	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Erkel-Rousse	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Heilemann				Year 1	Year 2	Year 3	Year 4	Year 1
Jungnickel	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Klein	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Malgarini			Year 1	Year 2	Year 3	Year 4	Year 1	Year 2
Matkowski		Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3
Mustonen	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Nilsson	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Oppenländer	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Poser	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Scherrer						Year 1	Year 2	Year 3
Shirakawa		Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3
Suur-Kujala	Year 1	Year 2						
Tyrkkö			Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Vértes	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Vanhaelen	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	
Successor Vanhaelen								Year 4
Yeh		Year 1				Year 1	Year 2	Year 3
Hu Chung-Ying			Year 2	Year 3	Year 4			
Vognstrup	Treasurer	Treasurer						
Bloch			Treasurer	Treasurer	Treasurer	Treasurer	Treasurer	Treasurer
Local Organiser								Local Organiser
Schips	Past President							
Zarnowitz	Honorary Member							

K:\CIRET\Association\Council\Lists\\History CIRET Council

二、ＣＩＲＥＴ會員大會會議程文件

(一) 2007年ＣＩＲＥＴ會員大會會議程

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Swiss Federal Institute of Technology Zurich

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CIRET

KOF

Zurich, October 15, 2007

Draft, rev. 1

CIRET

General Assembly Meeting

Thursday, 18 October, 2007, 19:45

Ifo Institute for Economic Research
Poschingerstrasse 5, DE-81631 Munich, (Tel. 0049 89 9224 1229)
Ludwig-Erhard-Saal (Main Building, Ground Floor, Tel. 0049 89 9224 1697)

Agenda

Determination of the quorum

1. Adoption of the Agenda
2. Adoption of the Minutes of the last General Assembly Meeting of 21 September 2006 in Rome ..... *Document*
3. Report on the Council Meeting
   (Jan-Egbert Sturm)
4. Report on the state of the Association (fluctuation of members)
   (Jan-Egbert Sturm) ..... *Document*
5. OECD-CIRET Journal «Journal of Business Cycle Measurement and Analysis»
   (Jan-Egbert Sturm, Daniel Bloesch)
6. CIRET Council: Elections ..... *Document*
   - Resignation of Jean-Jacques Vanhaelen ..... *Document*
   - Rudi Acx, National Bank of Belgium, Brussels, as successor of Jean-Jacques Vanhaelen ..... *Document*
   - Vagner Laerte Ardeo, Associate Director, IBRE- Fundação Getúlio Vargas Rio de Janeiro, Brasil, on a temporary basis as local manager of 29th CIRET Conference 2008 ..... *Document*
   - Re-election of Prof. Ullrich Heilemann
7. Account 2006: Report of the Auditors
   (Jan-Egbert Sturm) ..... *Document*
8. Financial Situation 2007/Approval of Budget 2008
   (Jan-Egbert Sturm) ..... *Documents*
9. 29th CIRET Conference 2008: preliminary information
   (Vagner Laerte Ardeo)
10. Varia
    - Approval of simplified bookkeeping of the financial year 2007 (same presentation as 2006)
      (Jan-Egbert Sturm)

(二) 2006 年 9 月ＣＩＲＥＴ會員大會會議記錄及出席名單

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CIRET-Office
c/o KOF
Konjunkturforschungsstelle
Swiss Institute for
Business Cycle Research

CIRET
KOF

Zurich, 18 October, 2006

DRAFT

Minutes

CIRET General Assembly Meeting
21 September, 2006
ISAE Institute for Studies and Economic Analyses, Rome

Members present	See attached list (The quorum is reached.)
CIRET-IDC	Dr. Daniel **Bloesch**
Secretary	Mrs. Katharina **Bloch**
Excused	Ms. Katarina **Bacic**, Mr. Paolo **Carnazza**, Dr. Zbigniew **Matkowski**, Mr. Ari **Tyrkko**, Mr. Jean-Jacques **Vanhaelen**, Dr. Andras **Vértes**, Mr. Thomas M. F. **Yeh**

Agenda

1. Adoption of the Agenda
2. Adoption of the Minutes of the last General Assembly Meeting of 15/11/05, in Brussels
3. a) Report on the Council Meeting
   b) Report on the state of the Association
4. Report on the joint OECD-CIRET Journal «Journal of Business Cycle Measurement and Analysis»
5. Account 255: Report of the Auditors
6. Approval of simplified bookkeeping of the financial year 2006
7. Approval of Budgets 2006 and 2007
8. Venue and Organisation of the 29th CIRET Conference 2008
9. Varia

Nr.	Item	Remarks
1	Adoption of the agenda	The agenda is adopted.
2	Adoption of the Minutes of the last General Assembly meeting of 15 November, 2005, in Brussels	The minutes of the last meeting are adopted.
3	a) Report on the **Council meeting** b) Report on the **state of the Association**	a) From 2007, **Prof. Dr. Jan-Egbert Sturm** will be President of CIRET succeeding Prof. Dr. Bernd Schips b) As the amount of members is declining, every effort by the members leading to new CIRET members is appreciated.

4	Report on the joint **OECD-CIRET Journal** «Journal of Business Cycle Measurement and Analysis»	There are substantial delays in the publication agenda due to a missing stock of ready-to-publish papers and due to delays in the referee process of some papers. Vol. 2, No. 3 has been published in April 2006. Two issues of Vol. 3 should be published by the end of 2007. Since September 2006, the JBCMA has been listed in the AEA electronic indexes, which are included in JEL on CD, e-JEL and EconLit. This should help to attract good papers. Some papers presented at the Conference had been submitted for publication in the JBCMA. The question of the copyrights for translated publications is raised. In the journal, original papers only should be published. An English translation of a paper might be published as «Report».
5	**Account 2005:** Report of the Auditors	The General Assembly approves the actions of the auditors.
6	Approval of **simplified bookkeeping** of the financial year 2006	The General Assembly approves simplified bookkeeping with respect to the financial year 2006.
7	Approval of **Budgets 2006 and 2007**	The two budgets are approved.
8	Venue and Organisation of the **29th CIRET Conference 2008**	The 29th CIRET Conference 2008 will take place in **September or October 2008 in Santiago de Chile.**
9	Varia	- The **General Assembly meeting 2007** will take place in **October/November 2007 in Munich.** - Prof. Schips expresses his gratitude to the European Central Bank as well as to the Deutsche Bundesbank for their continuous support of CIRET.

President

Bernd Schips

Secretary

Katharina Bloch

CIRET General Assembly
Rome, September 21, 2006
Participation

CIRET Members in total		total votes	quorum 1/3	Mem-bers	present	repres en-ted	total	total votes
CM (5 votes each)	32	160	53	**CM**	13	0	13	**65**
IM (1 vote each)	48	48	16	**IM**	15	0	15	**15**
Total		208	**69**	**Total**	28	0	28	**80**

Surname/First Name		Institution		CM	IM	Place	Ctry
Klein	Franz-Josef		Franz-Josef Klein		1	Overijse	BE
Ardeo	Vagner	FGV	Fundação Getulio Vargas	1		Rio de Ja	BR
Bloch	Katharina	ETH	Swiss Federal Institute of Technology	1		Zurich	CH
Stier	Winfried	HSG	Winfried Stier		1	Mörschwi	CH
Heilemann	Ullrich	RWI	University of Leipzig		1	Leipzig	DE
Döhrn	Roland	RWI	Rhine-Westphalia Institute for Econom	1		Essen	DE
Nerb	Gernot	IFO	Institute for Economic Research	1		Munich	DE
Oppenländer	Karl-Heinrich		Karl-Heinrich Oppenländer		1	Ottobrunn	DE
Poser	Günter	TUD	Technische Universität Darmstadt		1	Darmstad	DE
ppel	Wulfdiether		Hochschule für Politik München		1	Munich	DE
Urrila	Penna	EK	Confederation of Finnish Industry and	1		Helsinki	FI
Erkel-Rousse	Hélène	INSEE	National Institute for Statistics and Eco	1		Malakoff	FR
Nilsson	Ronny	OECD	Organisation for Economic Co-operatio	1		Paris Ced	FR
Vértes	Andras	GKI	Economic Research Co.	1		Budapest	HU
Malgarini	Marco	ISAE	Institute for Studies and Economic Ana	1		Rome	IT
Jungnickel	Jens-Uwe	IFO	Institute for Economic Research		1	Yokosuka	JP
Shirakawa	Ichiro	APU	Ritsumeikan Asia Pacific University		1	Oita-Ken	JP
Vanags	Ilmars	CSB	Latvian Statistics		1	Riga	LV
Adamowicz	Elzbieta	RIED	Warsaw School of Economics	1		Warsaw	PL
Garczarczyk	Józef		Poznan University of Economics	1		Poznán	PL
Toczynski	Tadeusz	CSO	Central Statistical Office	1		Warsaw	PL
Wargacki	Marian	UITM	Univ.of Inform. Technology&Management		1	Rzeszow	PL
Knudsen	Roger	KONJ	National Institute of Economic Researc		1	Stockholr	SE
Chyn	Regina	CEPD	Council for Economic Planning and De	1		Taipei	TW
Wood	Jonathan	CBI	Confederation of British Industry		1	London	UK
Curtin	Richard	UMICH	University of Michigan		1	New York	US
Özyildirim	Ataman	TCB	The Conference Board		1	Albany	US
enter	laan	SARB	South African Reserve Bank		1	Lyanwoo	ZA
Total				**13**	**15**		

Transferred voting rights

Name	First Name	Institution					
Total CM+IM represented			**0**	**0**			

Other participants (non members)							
Bloch	Katharina	CIRET office					
Bloesch	Daniel	CIRET office					
Total			**0**	**0**			

(三) 2006 年 10 月-2007 年 9 月ＣＩＲＥＴ會員變動

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CIRET Office
c/o KOF
Konjunkturforschungsstelle
Swiss Economic Institute

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CIRET

KOF

Fluctuation of CIRET Members
(CM: Corporate Member, IM: Individual Member)

October 2006 to September 2007

New CIRET Members

City	Country	Institution	Representative	Remark
Paris	FR	BdF – Banque de France	Gerard Kremer	**CM** from 2007
Santiago de Chile	CL	ECLAC	André Hofman	**CM** from 2007
Thorpe, Surrey	GB	CEMEX, Strategic Planning/Economic Research	Gonzalo de Cadenas Santiago	**IM** from 2007
Athens	GR	KEPE, Centre of Planning and Economic Research	Ekaterini Tsouma	**IM** from 2007
Rome	IT	IPI	Paolo Carnazza	**IM** from 2007

Persons or Institutions retiring from CIRET

City	Country	Institution	Representative	Remark
Brussels	BE	GfK Custom Research Worldwide	Mark Hofmans	**CM** 2006
Hamburg	DE	HWWA Hamburg Inst. of International Economics	Eckhardt Wohlers	**CM** 2001-2006; Inst. closed Dec. 2006
Rome	IT	IPI Institute for Industrial Promotion	Paolo Carnazza	**CM** 2004 - 2005
Stuttgart	DE	DaimlerChrysler	Jürgen W. Müller	**CM** 2001-2006
Taipei	TW	DGBAS Directorate-General of Budget, Accounting and Statistics	Joshua Gau	**CM** 2003 - 2006
Tübingen	DE	University of Tübingen	Gerd Ronning	**IM** 2000 – 2006
Paris	FR	Chamber of Commerce and Industry	Jacques Anas	**IM** 2002 – 2004
Paris	FR	Observatoire français des conjonctures économiques	Catherine Mathieu	**IM** 2004
Götheborg	SE	Göteborg University	Eva Andersson	**IM** 2002 – 2004
Taipei	TW	National Taiwan University	Hsien Feng Lee	**IM** 2002 – 2005
New York	US	FIBER	Agnes Biec	**IM** 2002 – 2004
New York	US	The Conference Board	Robert McGuckin	deceased **IM** 2000 - 2006

Zurich, 8 October, 2007 – kb

CIRET Members

October 2006	October 2007	Fluctuation
CM: 32	CM: 29	- 3
IM: 48	IM: 44	- 4

(四) 卸任比利時中央銀行統計處長 **Keam-Jacques Vanhaelen** 辭職函

BanqueNationale Bank
DE BELGIQUE VAN BELGIE

NBB • boulevard de Berlaimont 14 • BE-1000 BRUSSELS

Mrs. K. BLOCH
CIRET-Office
Konjunkturforschungsstelle der ETH Zürich
Swiss Institute for Business Cycle Research
ETH Zentrum WEH
CH - 8092 ZURICH

your letter	your reference	our reference	your correspondent	date
		DQ/2007/007/jjv	R. Acx phone + 32 2 221 24 03 fax + 32 2 221 32 30	2007-01-29

Dear Katharina,

Dear Mrs Bloch,

At the end of 2006 I retired from the National Bank of Belgium. Thanks to my responsibilities as head of the statistics directorate (and in an earlier stage as head of the division on macro-economic forecasts), I had the pleasure to represent the Bank in Ciret for many years. Ciret offered me the opportunity to discuss with and learn from the most renowned experts all over the world. Following the royal decree of April 17, 2002 I have been designated as a Council Member.

The end of my career at the National Bank of Belgium implicates also the end of my involvement in Ciret. I therefore decided to inform you that I resign as council member of Ciret.

It goes without saying that the National Bank of Belgium will continue to play an active role as corporate member of the Centre. Please feel free to contact my successor at the Bank, Mr Rudi Acx (tel :+32 22212403, e-mail: rudi.acx@nbb.be) for any question or problem you may have. I herewith strongly recommend Mr Acx as new Council Member for Ciret, representing, as foreseen in article 18 of the statutes, the country where the registered office is located.

./.

National Bank of Belgium Ltd.
boulevard de Berlaimont 14
BE-1000 BRUSSELS
phone + 32 2 221 – fax + 32 2 221
www.nbb.be

VAT BE 0203.201.340
RLP Brussels

I would be very grateful if you could give my best regards to all Council members and to all people of Koff who made it possible that Ciret is more and more considered as a centre of excellence in the field of surveys.

I would like to end by expressing my personal gratitude to you, Katharina, for the many years of excellent collaboration.

Kindest regards,

Jean-Jacques Vanhaelen
Heerweg 46
1650 Beersel
Belgium

Tel: +32/478370689
E-mail: jean-jacques.vanhaelen@telenet.be

(五) 新任比利時中央銀行統計處長 Ruci Acx 簡歷

CURRICULUM VITAE - RUDI ACX

Summary for CIRET

Rudi ACX, bron 28 january 1958, Tielt (Belgium)
Doctor in Economics, University Ghent (Belgium)

Former Research Fellow PH Spaak
Former Research Scholar Social Science Research Council of the USA, Washington, USA
Former Lecturer at the Erasmus faculty, Brussels
Former Member of statistical working groups of the ESCB, Eurostat, BIS and OECD
Associate Editor of The International Statistical Review, ISI, the Netherlands, 1999-2006
Member and Secretary of the Executive Body to the Irving Fisher Committee, 2001-2005

Current functions:
Head of the Statistics department of the National Bank of Belgium
Professor at the Catholic University of Brussels
Administrator to the St. Andries Hospital
Expert for missions on behalf of the International Monetary Fund
Consultant in statistics to central banks of eastern European countries
Member of the Committee on Monetary, Financial and Balance of Payments Statistics, Luxemburg
National Coordinator of the SDDS for Belgium
Member of the Statistics Working Group of the EU Council
Elected Member of the International Statistical Institute (ISI)
Member of the Statistical Programme Committee (European Commission)
Co Secretary to the Board of the National Accounts Institute of Belgium (NAI)
Chairman of the Scientific Committee on National Accounts of the NAI
Member of the Bureau of the Belgian High Council for Statistics
Member of the Eurostat Group of "Directors of National Accounts"

Over 60 publications in national and international reviews and some books on financial, monetary and national accounts subjects.
Many active participations (as author, discussant or chairman) in different scientific congresses

(六) 巴西 FGV 經濟學院（IBRE）副院長 Vagner Laerte Ardeo 簡歷

CURRICULUM VITAE

VAGNER LAERTE ARDEO

tel: 55 21 2559-5496 cel: 55 21 9974-6457 home: 55 21 2431-1511
e-mail: vardeo@fgv.br

Rua Prefeito Dulcídio Cardoso, 420
22793-082 –Barra da Tijuca, Rio, R.J. Brazil

EDUCATION

- Master's Degree - Mathematical Economics – 1990- Instituto Matemática Pura e Aplicada- **IMPA**.

- Graduation – Airspace Engineering –1983 - Instituto Tecnológico de Aeronáutica - **ITA**.

PROFESSIONAL EXPERIENCE

I- Fundação Getúlio Vargas - FGV

- Jun/04 - Vice-President of the Brazilian Institute of Economics – IBRE

II- National Telecomunications Agency - ANATEL

- Jul/02 - Nov/02 – Executive Superintendent

III- Companhia Siderúrgica Nacional – CSN

- Mar/97 - Dec/98 – Director of Strategic Planning
- Dec/97 - Apr/01 – President of CSN INVEST
- Jan/99 - Jun/02 – Assistant Chief of Staff to President
- Aug/96 - Mar/97 – Assistant Manager of Corporate Center

IV- City of Rio de Janeiro - PCRJ

- Jan/95 - Jul/96 – Deputy Secretary of Finance
- Jan/93 - Dec/94 – Chief of Staff of Secretary of Finance

V- Finance and Planning Ministry - MEFP

- Dec/92 - Jan/93 – Special Assistant to Planning Minister
- Jan/92 - Nov/92 – Coordinator of Foreign Affairs Office
- mai/90 a dez/91 – Head of Technical Coordination Department

VI- Institute of Applied Economic Research – IPEA

- Nov/02 - May/04 - Coordinator of Social Security Studies
- nov/84 a abril/90 - Planning and Research Analyst
- jan/84 a out/84 - Consultant

BOARD MEMBERSHIPS

I- Board of Directors

- Director of VALEPAR, holding company that controls Companhia Vale do Rio Doce (CVRD) (1999-2001).
- Alternate Director of CVRD's board (1999-2001).
- Director of Companhia Siderúrgica Nacional (CSN) (1997-2003).
- Deputy Chairman of the Advisory Board of the Employees Investment Fund of CSN (2000-2002).
- Member of the Advisory Board of the Pension Fund of CSN (1998-2002).
- Director of Ferrovia Centro Atlântica –FCA (1998-99)
- Director of CBTU (1991/1992).
- Alternate Director of LIGHT (1999-2000).

II- Fiscal Comitee of the Board

- TELESP (1992).
- LIGHT (1992).

CAREER HIGHLIGHTS

- Renegotiation of Brazil's sovereign foreign debt under the Brady Plan (US$ 44 billion). Responsible for the financial architecture of the agreement, including the terms and conditions of the "C-bond" and other bonds. (1990-1992).
- Development of the methodology that measures the quarterly GDP adopted by the IBGE, which became the official Brazilian methodology (1989).
- Participant in the technical aspects of the privatization of CVRD (1998).
- Fiscal adjustment of the City of Rio de Janeiro, netting R$1 billion, utilized in investments such as the construction of one the main thoroughfares "Linha Amarela" (1993-96).
- Strategic planning of CSN which resulted in a large increase in market capitalization (1997-98).
- Issuance of the first City of Rio de Janeiro bonds, in the amount of US$125 million. It was the first foreign issuance by a Latin American municipality after the 1980's debt crisis (1996).
- Management of CSN's Investment Club which held 10% of the company's capital (1997-2002).
- Coordination and planning of the variable remuneration program of CSN's employees (1997-2001).
- Coordination of the attempted merger between CSN and CORUS (2001-02).
- Creation of the "Aleijadinho Project" that recuperated and restored the masterpieces of sculptor "Aleijadinho" (1730-1814) in the Bom Jesus do Matosinhos Sanctuary - Congonhas do Campo, Minas Gerais (2001).
- Creation of the simulation model of social and economic impact of the National Reconstruction Project, for the federal government (1991).
- Research on the strategic energy plan of Brazil, for the federal government (1984-88).

ARTICLES PUBLISHED

Dozens of articles and white papers published in economics applied to Brazil in specialized journals and magazines such as "Planejamento e Pesquisa Econômica – PPE", "Revista Brasileira de Economia- RBE", "Conjuntura Econômica", and "Folha de São Paulo", among others.

ACADEMIC ACTIVITIES

- Professor of class on "National Accounts" at The Catholic University – PUC – Rio de Janeiro - 1990.
- Professor of class on "Social Accounting" At the National School of Statistical Sciences - 1989.
- Professor of classes on Econometrics and Operational Research at Cândido Mendes University - 1989.

LANGUAGES

- English – fluent, spoken and written
- Spanish – reading and comprehension

PERSONAL REFERENCE

- Luiz Guilherme Schymura de Oliveira – IBRE /FGV – tel 55 21 2559-5882, schymura@fgv.br
- Maria Sílvia Bastos Marques- MS&CR2- tel 55 21 2508-8647, msilvia@cr2.com.br

Rio de Janeiro, September, 20th, 2007.

Vagner Laerte Ardeo

(七) 2006 年ＣＩＲＥＴ財務稽核報告

Financial Year 2006

Report of the Auditors

The financial year 2006 closed with a **loss of EUR 5'555.78** (corresponding to CHF 8'739.79, middle rate 2006: CHF 1.5731).

The account does not cover the whole cost incurred. According to the table below, the labour cost spent on the database and the website as well as on general administration sum up to EUR 25'749.59 (CHF 40'506.68). The working hours dedicated to the JBCMA-OECD-CIRET Journal come to EUR 26'660.00 (CHF 41'938.84). Travel cost and miscellaneous cost borne by KOF amount to EUR 7'858.45 (CHF 12'362.13).

Liabilities side (debit)

In the financial year, the income of membership fees (including interests of EUR 19.77) amounted to a total of **EUR 27'754.67.**

The list of the members indicating their fee payments is attached to this document.

Expenses (credit)

The expenses result from

- a payment made **to KOF** in CHF by debiting the account at UBS in Zurich of **EUR 13'031.5**
- a payment made in EUR **to KOF** by debiting the account at NBB in Brussels of **EUR 13'366.3**
- Travel Expenses by debiting the account at UBS in Zurich of EUR 6'749.7
- Bank charges by debiting the account at UBS in Zurich of EUR 100.6
- Bank charges by debiting the account at NBB in Brussels of EUR 62.1

The total of these payments sum up to **EUR 33'310.4**

On December 31, 2006, the account balances are as follows:

- UBS Zurich: CHF 1'563.76/**EUR 994.06**
- NBB Bruxelles: **EUR 2'695.97**
- **Total** **EUR 3'690.03**

The costs **borne by KOF can** be itemised as follows

- JBCMA Journal	EUR	26'660.00	44.24 %
- CIRET Office (Database/Website/Admin.)	EUR	25'749.59	42.72 %
- Travel expenses	EUR	6'947.57	11.53 %
- Misc. Costs	EUR	910.88	1.51 %
Total	**EUR**	**60'268.04**	**100.00 %**
(Income from CIRET	EUR	26'397.89	43.80 %)
	(EUR	13'031.59)	
	(EUR	13'366.30)	

The auditors checked the documents proving the expenses.

The labour cost of the KOF personnel (permanent staff) was generated by the central service group of KOF based on the corresponding work reports (time sheets).

Page 1

Travel expenses had to be paid to the President, to the secretary/treasurer, as well as to the editor-in-chief of the Journal of Business Cycle Measurement and Analysis JBCMA, as well as to the auditor presenting the accounts 2005 at the occasion of the General Assembly meeting in Rome.

Conclusion

Based on the documents put at our disposal, the auditors could check the account of the CIRET association. All expenses were proved by expense vouchers except the labour cost.

Prof. Winfried Stier
9.8.2007

Peter Weiss
10.10.2007

Signed and dated annexes:

Account CIRET 2006 with
- detailed list with vouchers
- list of members and payments of membership fees

CIRET

KOF

15.10.2007/kb

Account CIRET 2006 - Budget CIRET 2006

Exchange rate: 1 EURO = CHF 1.5731

Debit	Account 2006 EUR	Budget 2006 EUR	Credit	EUR	Budget 2006 EUR
Contribution to KOF (from UBS acc.)	13'031.59	32'200.00	Member contributions EUR (NBB)	15'167.26	14'500.00
Contribution to KOF (from EUR acc.)	13'366.30		Member contributions CHF (UBS)	12'567.64	12'500.00
Travel Expenses	6'749.79		Extra Support CHF	0.00	2'500.00
Bank charges (UBS)	100.60		Bank interest (UBS)	19.77	
Bank charges (EUR)	62.16				
Result	-5'555.78	-2'700.00			
Total Debit	**27'754.67**	**29'500.00**	**Total Credit**	**27'754.67**	**29'500.00**

Balance Sheet CIRET 2006

	UBS CHF	UBS EUR	NBB EUR	Total EUR
Balance on 1 January 2006	13'038.86	8'288.64	957.17	9'245.81
Balance on 31 December 2006	1'563.76	994.06	2'695.97	3'690.03
Annual Change	-11'475.10	-7'294.58	1'738.80	-5'555.78

Expenses borne by KOF/Payments received from CIRET

Debit	EUR	Budget 2006 EUR	Credit	EUR	Budget 2006 EUR
CIRET Office/Administration (Secretariat, Conference, Database/Website)	25'749.59	85'400.00	CIRET Contribution to KOF (CHF)	13'031.59	32'200.00
JBCMA Journal	26'660.00	41'400.00	CIRET Contribution to KOF (EUR)	13'366.30	
Travel expenses	6'947.57	9'900.00			
Misc. Costs	910.88	0.00	Result (expenses borne by KOF)	33'870.14	104'500.00
Total Debit	**60'268.04**	**136'700.00**	Total Credit	**60'268.04**	**136'700.00**

General Remark

Invested working hours during the past years resulted in a more efficient administration of the conference than in previous years (automated registrations, updated lists available online).

CIRET Office/Administration: Preparation and handling of the conference administration, abstracts and papers, planning of the sessions, improvement of the registration process

JBCMA Journal: 2 issues (instead of 3) established and dispatched, preparation of first volume 2007, handling of incoming papers, sales campaigns

CIRET KOF

15.10.2007/kb

Financial Situation CIRET 2007

Exchange rate: 1 EURO = CHF 1.6400

Debit	CHF	EUR	Budget approved EUR	Credit	CHF	EUR	Budget approved EUR
Contribution to KOF	33'000	20'100	26'300	Membership fees CHF (UBS)	18'000	11'000	13'000
Travel Expenses	7'700	4'700		Membership fees EUR (NBB)		13'200	10'000
				Result		600	3'300
Total Debit		24'800	26'300	Total Credit		24'800	26'300

Expenses to be borne by KOF Swiss Economic Institute

Debit	CHF	EUR	Budget approved EUR	Credit	CHF	EUR	Budget approved
CIRET Office/Administration	8'800	5'400	32'900	Contribution CIRET to KOF	33'000	20'100	26'300
JBCMA Journal	35'500	21'600	41'400				
Conference (included in CIRET Office/Administration)			2'600				
Travel expenses			1'300				
Database/Website (included in CIRET Office/Administration)			6'600	To be covered by KOF			58'500
Total Debit		27'000	84'800	Total Credit		20'100	84'800

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CIRET KOF

15.10.2007/kb

Budget CIRET 2008

Exchange rate: 1 EURO = CHF 1.6400

Debit	CHF	EUR	Credit	CHF	EUR
Contribution to KOF	18'000	11'000	Member contributions (UBS)	19'700	12'000
Travel Cost, Hotel Santiago	27'300	16'600	Member contributions (NBB)	25'000	15'200
			Result		400
Total Debit		27'600	Total Credit		27'200

Expenses to be borne by KOF Swiss Economic Institute

Debit	CHF	EUR	Credit	CHF	EUR
CIRET Office, Secretariat, Database/Website	40'500	24'700	Contribution CIRET to KOF	18'000	11'000
JBCMA Journal	41'000	25'000			
Misc. Costs	3'100	1'900	To be covered by KOF		40'600
Total Debit		51'600	Total Credit		51'600

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三、 Ifo 經濟調查資料方法與應用研討會會議議程

2nd Ifo Conference

„Survey Data in Economics – Methodology and Applications"

CESifo Conference Centre, Munich, Germany

Programme

Friday, 19 October 2007

09:00 – 09:15	Welcome and Introduction
	Plenary Session 1: Methodically Aspects of Surveys
09.15 – 10.00	**Reliability of the Visual Analog Scale as a Measurement Method of Economic Expectations** ANNA STANGL Discussant: Pablo de Pedraza
10.00 – 10.45	**Continuous Web Voluntary Surveys: Sample Bias, Weights and Efficiency of Weights** Kea Tijdes, PABLO DE PEDRAZA, Rafael Munos de Bustillo Discussant: Anna Stangl
10.45 – 11.15	Coffee Break
	Plenary Session 2: Monetary Policy
11.15 – 12.00	**Forecasting ECB Monetary Policy: Accuracy is (Still) a Matter of Geography** Helge Berger, MICHAEL EHRMANN, Marcel Fratscher Discussant: Elmer Sterken
12.00 – 12.45	**Survey Based Expectations in the U.S. Taylor Rule** ELMER STERKEN Discussant: Michael Ehrmann
12.45 – 14.00	Lunch

Plenary Session 3: Business Cycles

14.00 – 14.45	**Can a multi-sectoral design improve indicator-based forecasts of the GDP growth rate? Evidence from Switzerland** MICHAEL GRAFF Discussant: Johannes Mayr
14.45 – 15.30	**Assessing the Forecast Properties of the CESifo World Economic Climate Indicator: Evidence for the Euro Area** Oliver Hülsewig, JOHANNES MAYR, Stéphane Sorbe Discussant: Michael Graff
15.30 – 16.00	Coffee Break

Plenary Session 4: Bank Behaviour

16.00 – 16.45	**Bankers´ Perceptions of Euro Area Lending Business** HANNAH S. HEMPELL Discussant: Jarco Fidrmuc
16.45 – 17.30	**Integrated with Their Feet: Cross-Border Lending at the German-Austrian Border** JARKO FIDRMUC, Christa Hainz Discussant: Hannah S. Hempell
19:30 -	Conference Dinner at "Restaurant Seehaus im Englischen Garten"

Saturday, 20 October 2007

Plenary Session 5: Inflation Expectations

09.30 – 10.15	**Heterogeneity and Learning in Inflation Expectation Formation: An Empirical Assessment** DAMJAN PFAJFAR, Emiliano Santoro Discussant: Andres Manzanares
10.15 – 11.00	**Survey Measures of Inflation Expectations: Comparing the Information Content of Point Estimates and Probabilistic Forecast** Juan Angel Garcia, ANDRES MANZANARES Discussant: Damjan Pfajfar
11.00 – 11.30	Coffee Break

Plenary Session 6: Adjustment Behaviour

11.30 – 12.15 **Moment Conditions for Estimating State Dependent Adjustment with Unobserved Targets: Methods and an Application on Investment Survey Data**
ULF VON KALCKREUTH
Discussant: Sarah Rupprecht

12.15 – 13.00 **The Speed of Adjustment to Demand Shocks: A Markov-chain Measurement Using Micro Panel Data**
Christian Müller, EVA KÖBERL
Discussant: Ulf von Kalckreuth

13.00 – 14.00 Lunch

Plenary Session 7: Special Topics I

14.00 – 14.45 **Freedom of Choice in Macroeconomic Forecasting**
Nicolay Robinzonov, KLAUS WOHLRABE
Discussant: Christian Müller

14.45 – 15.30 **Micro and Macro Rationality: Evidence from Individual Survey Data**
CHRISTIAN MÜLLER, Aniela Wirz, Nora Sydow
Discussant: Klaus Wohlrabe

15.30 – 16.00 Coffee Break

Plenary Session 8: Special Topics II

16.00 – 16.45 **"What did you say?" – Comparing Qualitative and Quantitative Survey Data**
ROLF SCHENKER
Discussant: Ewa Stanislawska

16.45 – 17.30 **Consumer Inflation Expectations in Europe: Some Cross-Country Comparisons**
Tomasz Lyziak, EWA STANISLAWSKA
Discussant: Rolf Schenker

End of Conference

四、 Ifo 經濟調查資料方法與應用研討會論文

（一） "What did you say?" – comparing qualitative and quantitative survey data

"What did you say?"

Comparing qualitative and quantitative survey data

Rolf Schenker*

September 10, 2007

Contents

Abstract

This paper compares quantitative and qualitative data on firm level. This has not yet been done in the literature. The data used here is taken from two Swiss investment surveys.

We will see that the mean change in investment of firms planning to increase (decrease) investments is indeed positive (negative). In contrast, the mean change in investment of firms indicating "no change" in the qualitative survey is indeed virtually zero. Carlson & Parkin (1975) assume the quantitative observations to follow a normal distribution. Other research (e.g. Dasgupta & Lahiri 1992) has been done assuming other distributions. In this paper we show that the micro data do not follow a normal or logistic distribution.

Furthermore, we adopt the response functions presented by Ronning (1984) to the investment data. They help us to determine the share of firms giving the different qualitative statement for every instance of the quantitative data. We will show that with larger (smaller) quantitative changes, more firms give positive (negative) qualitative statements.

Keywords: Response Functions, Investment survey, Qualitative response, Contingency Table

JEL classification: C5, E22, C42

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I thank Christian Müller, Christian Conrad and Klaus Neusser for helpful comments.

1 Introduction

The basic idea of business surveys is to gather from the development of individual variables (micro variables) to the development of economy-wide variables (macro variables, i.e. from the investment of interviewed firms to the investment in the whole economy). When surveys pose qualitative questions, it is assumed that firms have quantitative assessments of a variable and transform them to qualitative statements. Most qualitative questions propose three answers (e.g. "increase", "no change", "decrease"). To be included in econometric models, these qualitative answers have to be quantified in some way. In most cases, the quantitative data is not available on firm level. That's why all popular quantification methods investigate the share of interviewees giving each of the three answers and compare them to the change in the quantitative macro variable. We will call these shares A_t (for "increase"), B_t (for "no change"), and C_t (for "decrease").

A widely used quantification method is the one presented by Carlson & Parkin (1975). Assuming the quantitative (change of the) micro variables to follow a normal distribution, they calculate the mean ($\hat{\mu}_t$) and standard-deviation ($\hat{\sigma}_t$) of these distributions from the response shares. Other research (e.g. Dasgupta & Lahiri 1992) has been done assuming normal, t- or logistic distributions. Dasgupta & Lahiri (1992) showed that the assumed distribution does not have much influence on the estimation results. Section 4.2 gives an explanation, why.

This paper presents Swiss investment data, taken from a quantitative and a qualitative survey. We have micro data from both surveys available and will be able to compare the data on firm level. Like that we will be able to investigate the relation of quantitative and qualitative micro data. Additionally, we can test the above assumptions about the distribution of the micro data.

The paper is organized as follows: section 2 describes the data, and section 3 highlights the procedure that was adapted to the quantitative data before comparing it to the qualitative data. Section 4 is dedicated to the presentation of the estimation results: It begins with contingency tables (section 4.1), giving a first impression of the relation between the qualitative and the quantitative answers. Section 4.2 presents the distribution and density functions of the qualitative answers. In section 4.3 the answer patterns for the qualitative questions subject to the quantitative changes will be analyzed by reanimating the response functions introduced by Ronning (1984).

2 The data

KOF conducts two annual investment surveys. The quantitative survey (IVN) is made in collaboration with the Swiss federal statistical office. It is conducted in spring with about 12'000 firms. The qualitative survey (IVL) is conducted in fall. Its sample comprises 6800 firms. Both samples cover firms from the manufacturing, the construction and the service sector. They partly overlap

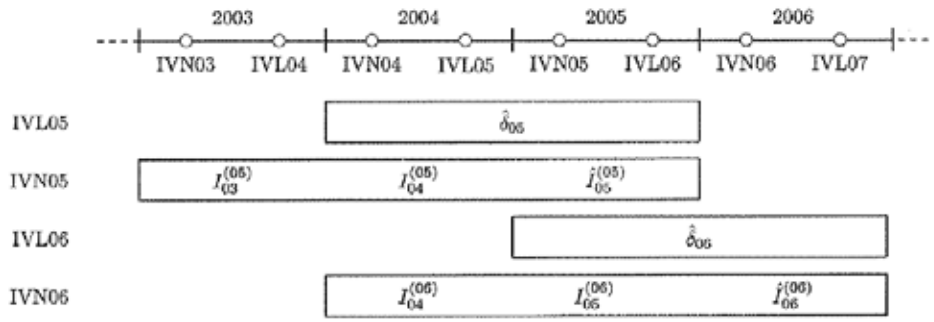


Figure 1: Time pattern

one another, allowing us to compare the answers on micro (firm) level. This has not yet been done in the literature.

In the quantitative survey (IVN), firms are asked about their investments as monetary amounts. The survey covers investment in the year of interview and the two preceding years. Additionally, firms are asked to indicate the number of employees. In the qualitative survey (IVL), firms are asked about the planned change in investment from the actual to the next year. Firms indicate whether they plan investments to increase, stay the same, or decrease. Additionally, firms are asked about their certainty in their own investment plans. The answers proposed are "very sure", "rather sure", "quite unsure", and "not sure".

Figure 1 may help to clarify the workflows: Every year KOF conducts two investment surveys: the quantitative survey in spring and the qualitative in fall. The qualitative survey 2005, shortly IVL05, is conducted in fall 2004. Firms are asked about the planned change in their investment sums from 2004 to 2005. The quantitative survey 2005, IVN05, is conducted in spring 2005. There, firms indicate their investment sums in 2003, 2004, and 2005. We use the following general notation: Data collected by IVN in year t are $I_{t-2}^{(t)}$, $I_{t-1}^{(t)}$, and $\hat{I}_t^{(t)}$ (e.g. $I_{03}^{(05)}$, $I_{04}^{(05)}$, and $\hat{I}_{05}^{(05)}$), while data collected by IVL of year t (conducted in fall of year $t-1$) are called $\hat{\delta}_t$ (e.g. $\hat{\delta}_{05}$).[1]

Using data from IVL05 and IVN05, we can compare qualitative and quantitative investment plans. In October-November 2004, when answering IVL05, firms have data about their business in three quarters of 2004. Based on this information, they make their investment plans for 2005. The IVN questionnaire is completed half a year later. This means that firms have business data until the first quarter 2005. When data from IVL and IVN diverge, this does not necessarily mean that firms themselves are inconsistent. It may also happen that new information influences the investment plans of the firms.

In both surveys firms are asked about their investment plans in equipment and software, in constructions and total fixed investment. Each firm that completes all relevant parts of the ques-

[1] Subscripts indicate the time of investment, while superscripts indicate the survey which provides the information. $\hat{I}_t^{(t)}$ and $\hat{\delta}_t$ are plans rather than realizations.

tionnaires thus generates three observations. For the following analyses we only look at the data for total fixed investment and merge the observations of all years.

3 Procedure

As we have seen in section 2, the qualitative survey asks for the changes in investment, while the quantitative survey asks for investment sums themselves. To compare qualitative and quantitative investment statements, the quantitative data has to be transformed into a measure for the "changes in investment". Whether a certain change in investment is considered as a "constant investment" presumably depends on the average investment sums of a firm. That's why the absolute change in investment $(\tilde{I}_t^{(t)} - I_{t-1}^{(t)})$ is not usable. Furthermore, the measure should be able to distinguish between a slight sliding and an abrupt drop-out of investment. The relative change in investment $\frac{\tilde{I}_t^{(t)} - I_{t-1}^{(t)}}{I_{t-1}^{(t)}}$ is not able to distinguish these variations. If $\tilde{I}_t^{(t)} - I_{t-1}^{(t)}$ is divided by the average investment sum, even this requirement is fulfilled. In what follows, the quantitative change in investment is defined as

$$\widehat{\psi}_t \equiv \frac{\tilde{I}_t^{(t)} - I_{t-1}^{(t)}}{I_\mu^{(t)}}$$

with $I_\mu^{(t)} \equiv \frac{I_t^{(t)} + I_{t-1}^{(t)} + I_{t-2}^{(t)}}{3}$. With this definition, positive (negative) values of $\widehat{\psi}_t$ indicate increasing (decreasing) investments in t compared to $t-1$. The larger the absolute value of $\widehat{\psi}_t$, the larger is the change in investment relative to the mean investment of the respective firm. $\widehat{\psi}_t = 2$ means that the change in investment from $t-1$ to t amounts twice the mean investment in $t-2$, $t-1$ and t. If for a certain firm $I_{t-2}^{(t)} = I_{t-1}^{(t)} = 0$ and $\tilde{I}_t^{(t)} \neq 0$, then $|\widehat{\psi}_t| = 3$.[2]

4 Results

4.1 Contingency Tables

To get a general idea of the results, one should have a look at the contingency table (table 1). It shows the frequency of all combinations of qualitative answers $\hat{\delta}_t$ and quantitative changes $\widehat{\psi}_t$. The rows represent different values of $\hat{\delta}_t$. A -1 stands for "decrease", a 0 for "stay the same" and a 1 for "increase". In the columns of table 1, different values of $\widehat{\psi}_t$ are shown: a -1 stands for negative, a 0 for zero, and a 1 for positive values. The upper left and lower right field of the table represent consistent combinations of $\hat{\delta}_t$ and $\widehat{\psi}_t$, while the upper right and lower left field stand for inconsistent combinations. The contingency table shows different facts: The share of consistent answers (38%) is higher than the share of inconsistent answers (20%). Additionally, we can see that the mean of $\widehat{\psi}_t$ is positive (negative) for $\hat{\delta}_t = 1$ ($\hat{\delta}_t = -1$), i.e. the mean investment of firms with $\hat{\delta}_t = 1$ ($\hat{\delta}_t = -1$) is in fact larger (smaller) than in the preceding year. The differences are

[2] To avoid a contamination of the estimation results by extreme values, all data with $|\widehat{\psi}_t| > 2$ are omitted. With the guillaumine at $|\widehat{\psi}_t| > 2$, 380 of the 4830 observations drop out.

not significant, though. Another interesting result of the contingency table is that for firms with $\hat{\delta}_t = 0$, the mean of $\widehat{\psi}_t$ is actually virtually zero.[3]

Mean of $\widehat{\psi}_t$ Std. dev. of $\widehat{\psi}_t$ observations		sign($\widehat{\psi}_t$) −1	0	1	all
$\hat{\delta}_t$	−1	-0.730 0.538 728	0.000 0.000 85	0.459 0.437 307	-0.349 0.723 1120
	0	-0.625 0.557 749	0.000 0.000 204	0.511 0.462 691	-0.070 0.717 1644
	1	-0.648 0.557 529	0.000 0.000 117	0.679 0.504 1040	0.216 0.790 1686
	all	-0.669 0.552 2006	0.000 0.000 406	0.589 0.489 2038	-0.032 0.779 4450

Table 1: Contingency table

4.2 Distribution and Density Functions

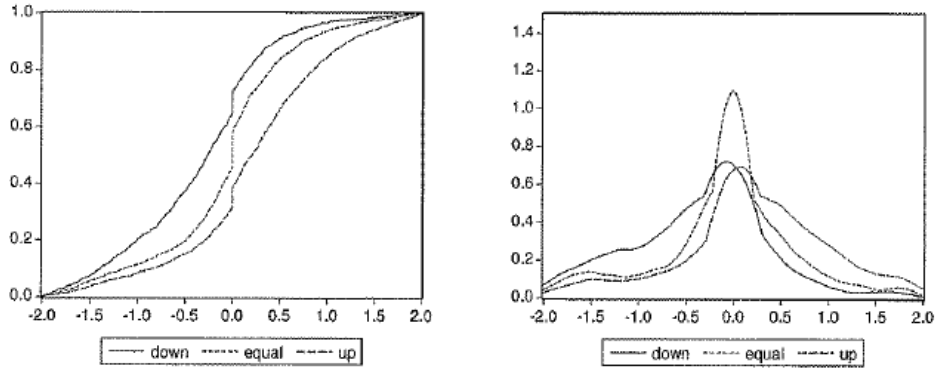
Contingency tables can only assess the sign of $\widehat{\psi}_t$. Density and distribution functions for the different qualitative statements however allow us to get more quantitative insights. We calculate the empirical distribution and estimate the density functions for $\hat{\delta}_t = i \; \forall \; i = -1, \ldots, 1$ and for the entire sample as a whole.

Plotting the empirical distribution function (cf. fig. 2(a)), we see that the distribution functions for $\hat{\delta}_t = i \; \forall \; i = -1, \ldots, 1$ show a jump at $\widehat{\psi}_t = 0$. These jumps are caused by the observations standing in the column $\widehat{\psi}_t = 0$ of the contingency table. When estimating the density functions, this concentration leads to a bunch in the region of $\widehat{\psi}_t = 0$ (cf. fig. 2(b)). One could argue that each distribution is a combination of two distributions: a point-distribution with $\widehat{\psi}_t = 0$ and a (maybe parametric) distribution. Figure 3 shows the distribution and density functions of the data when all observations with $\widehat{\psi}_t = 0$ are excluded.

An observation that does not change when shifting from fig. 2(b) to fig. 3(b) are the large intersections of the density functions. The areas under the density functions in the left (right) of $\widehat{\psi}_t = 0$ are the observations of the left (right) column in the contingency table. The area under the density function for $\hat{\delta}_t = 1$ on the left of $\widehat{\psi}_t = 0$ represent the inconsistent observations in the lower left field of the contingency table.

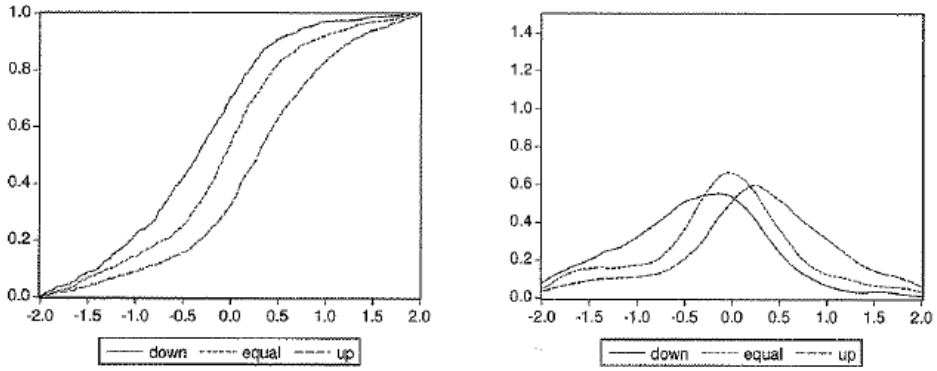
Figure 4 shows stylized density functions. It will help us to develop a measure for the inter-

[3] Virtually all of the 406 observations with $\widehat{\psi}_t = 0$ are firms with $I_t^{(t)} = I_{t-1}^{(t)} = 0$.



(a) Distribution Functions (b) Density Functions

Figure 2: Distribution of $\widehat{\psi}_t$ for $\hat{\delta}_t = i \; \forall \; i = -1 \ldots 1$. Nonparametric estimation of the density functions using Epanechnikov.



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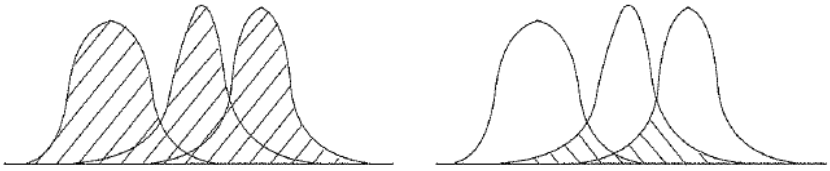
section of the density functions. We first determine $\mathcal{A}$, the area of all density functions together (the shaded area in fig. 4(a)). In the case of 3 density functions, $\mathcal{A}$ will be at most 3 (when the density functions are disjoint). Then we determine $\mathcal{B}$, the area lying under more than one of the densities (cf. fig. 4(b)). In the case of disjoint densities, $\mathcal{B} = 0$. $\mathcal{B}/\mathcal{A}$ is a measure of intersection. It is bounded to the interval $[0, 1]$. If $B/A = 1$ then the density functions are congruent. In fig. 2(b), $\mathcal{A} = 1.395$ and $\mathcal{B} = 0.918$, thus $\mathcal{B}/\mathcal{A} = 65.8\%$. In fig. 3(b), the intersection in slightly larger: $\mathcal{A} = 1.374$ and $\mathcal{B} = 0.953$, thus $\mathcal{B}/\mathcal{A} = 69.3\%$. This means that when excluding all observations with $\widehat{\psi}_t = 0$, the observations for $\hat{\delta}_t = -1, 0$ and 1 are more similar than with all observations.

Now, we are going to test whether the distributions functions follow some parametric distributions. First, we test the distributions of $\widehat{\psi}_t$ conditioned on $\hat{\delta}_t = i \; \forall i = -1, \ldots, 1$. The distributions



(a) Density functions: area A (b) Density functions: area B

Figure 4: Overlap

Sample	Density	normal		logistic	
		Watson	p-value	Watson	p-value
total	$\delta_t = -1$	0.556	0.000	0.495	<0.005
	$\delta_t = 0$	2.387	0.000	1.484	<0.005
	$\delta_t = 1$	0.880	0.000	0.380	<0.005
truncated	$\delta_t = -1$	0.164	0.010	0.173	<0.005
	$\delta_t = 0$	0.858	0.000	0.425	<0.005
	$\delta_t = 1$	0.615	0.000	0.192	<0.005

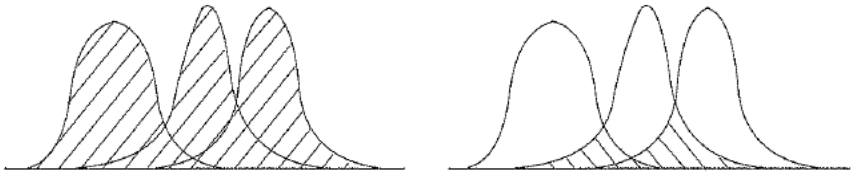
Table 2: Empirical Distribution Tests

we test against are the normal and the logistic. The measure to test the empirical distributions for parametric distributions is the Watson (U2)-statistics. For details on the computation of the test statistics and the p-values see Durbin (1973) or Stephens (1986). As we can see in the first part of table 2, the three tested empirical distributions are significantly different from the parametric distribution functions.[4] The second part of table 2 shows the test results for the truncated sample (observations with $\widehat{\psi}_t = 0$ are excluded). In the truncated sample, the values for $\widehat{\psi}_t$ do not follow a normal or logistical distribution, either.

After examining the distribution functions individually, we are now going to compare them. Looking at the distributions for the three statements $\hat{\delta}_t = i \; \forall i = -1, \ldots, 1$, it seams clear that they are different. To compare distributions, different test are known in the literature. A widely used measure to compare the means of empirical distributions is the Anova F-statistics. To compare the medians, we use the Kruskal-Wallis-Statistics. This is a generalization of the Mann-Whitney test. The idea is to rank the series from smallest value to largest, and to compare the sum of the ranks from of the different subgroups. For details, see Sheskin (2000). To compare the variances of different distributions, we use the Brown-Forsythe test. It is based on an analysis of variance (ANOVA) of the absolute difference from the median. For details, see Brown & Forsythe (1974). The results of these tests show that the means, medians and variances of these distributions are significantly different (cf. table 3).

Now, we will analyze the distribution of the $\widehat{\psi}_t$ regardless of $\hat{\delta}_t$. Carlson & Parkin (1975)

[4]These results hold too if the observations with $|\widehat{\psi}_t| > 2$ are not excluded.



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[4]These results hold too if the observations with $|\widehat{\psi}_t| > 2$ are not excluded.

Ronning (1984) presented response functions indicating the probability of the qualitative statements ($\hat{\delta}_t = i \; \forall i = -1, \ldots, 1$) when a firm is confronted with a specific quantitative value ($\widehat{\psi}_t$). Response functions can be considered as advancements of the response shares: They indicate the share of firms giving different qualitative statements for different values of $\widehat{\psi}_t$.

Ronning expects that the probability of a "completely wrong qualitative statement" ($\hat{\delta}_t = -1$ when $\widehat{\psi}_t > 0$ or $\hat{\delta}_t = 1$ when $\widehat{\psi}_t < 0$) decreases with larger values of $|\widehat{\psi}_t|$. Furthermore he assumes an indifference interval in which the probability of $\hat{\delta}_t = 0$ is larger than 0. He assumes this interval to include $\widehat{\psi}_t = 0$.

We adopt this concept on the investment data and calculate response functions:

$$\gamma_{\widehat{\psi}_t}^{(i)} = \frac{N_{\widehat{\psi}_t}^{(i)}}{\sum_{k=-1}^{1} N_{\widehat{\psi}_t}^{(k)}} = \frac{\beta_{\widehat{\psi}_t}^{(i)} \cdot N_{\cdot}^{(i)}}{\sum_{k=-1}^{1} N_{\widehat{\psi}_t}^{(k)}}$$

with $\gamma_{\widehat{\psi}_t}^{(i)}$: value of the response function for $\hat{\delta}_t = i$ and $\widehat{\psi}_t$, $\beta_{\widehat{\psi}_t}^{(i)}$: Value of the density function for $\hat{\delta}_t = i$ at $\widehat{\psi}_t$, $N_{\widehat{\psi}_t}^{(i)}$: Quantity of firms with $\widehat{\psi}_t$ and $\hat{\delta}_t = i$, $N_{\cdot}^{(i)}$: quantity of firms with $\hat{\delta}_t = i$.

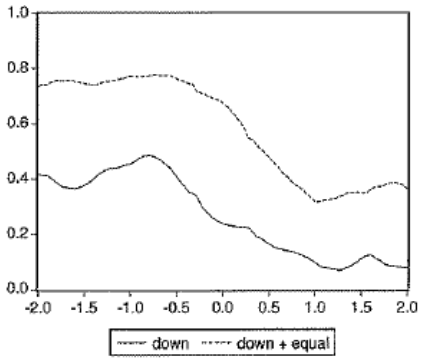

Figure 6: Response functions for total fixed investment

Figure 6 shows the response functions. In the negative interval of $\widehat{\psi}_t$, the share of firms with $\hat{\delta}_t = -1$ amounts 40% and decreases with augmenting $\widehat{\psi}_t$. Contrariwise, the share of firms with $\hat{\delta}_t = 1$ increases with augmenting $\widehat{\psi}_t$. The probability for $\hat{\delta}_t = 0$ is larger than zero and quite the same on the whole range $|\widehat{\psi}_t| \leq 2$. This means that the indifference interval, as defined by Ronning, is very large. All these observations do not change much if the answers are weighted by the corresponding subjective certainty indicated in the qualitative survey. This is because the share of firms indicating to be "not sure" and "quite unsure" is only 7% and these answers are distributed virtually uniformly on $|\widehat{\psi}_t| \leq 2$.

5 Conclusions

In this article we compared quantitative and qualitative investment data on firm level. It showed that firm's answers in these two surveys are in most cases congruent. The density functions show large intersections, though. Further research should try to investigate the determinants of these intersections. Possible factors of influence could be the firm size and the sector of the firm.

Another interesting issue would be to develop a quantification method that is based on the response functions rather than the response shares only. As the response functions investigate the response shares for different values of the quantitative changes $\widehat{\psi}_t$, a quantification method based on the response functions should show better performance than the methods based on the response shares.

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（二） Consumer Inflation Expectations in Europe: Some Cross-country Comparisons

CONSUMER INFLATION EXPECTATIONS IN EUROPE: SOME CROSS-COUNTRY COMPARISONS

Tomasz Łyziak[†]
Ewa Stanisławska[‡]

Abstract

The aim of our study is to analyse selected features of consumers' inflation expectations in European countries. Looking for adequate proxies of this directly unobservable variable we develop a set of criteria with which we assess the reliability of various survey measures of consumer inflation expectations (i.e. probability measures quantified on the basis of qualitative survey data, measures derived from quantitative survey question, balance statistics describing the distribution of responses to the qualitative survey question). Then we use the measures fulfilling our reliability requirements to examine three features of inflation expectations, namely their forecasting accuracy, causality between inflation expectations and actual future inflation and the long-run convergence of expectations to the actual future inflation. The forecasting accuracy of quantified measures of consumer inflation expectations in Europe is rather poor and similar to naive forecast. Even if they provide biased predictors of future inflation, there exists statistical causality between actual future inflation and current expectations and a majority of analysed measures converge to the rational expectations outcome in the long run. Our analysis may be useful in selecting adequate measures of consumer inflation expectations embodying information important in monetary policy making.

Key words: inflation expectations, survey, rationality

JEL classification: D12, D84, E58

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Opinions expressed in this paper are those of the authors and do not necessarily represent the views of the institution they work for.

Introduction

This paper follows several studies examining consumers' inflation expectations in Poland. So far we have developed measurement methods of Polish consumers' expectations based on survey data (e.g. Łyziak and Stanisławska 2006 a), analyzed formation process of inflation expectations, especially in the context of the credibility of inflation targets (Łyziak 2005; Łyziak, Mackiewicz and Stanisławska 2006), as well as used these measures in modelling inflation (Kokoszczyński, Łyziak and Stanisławska 2006). While evaluating rationality of Polish consumers' inflation expectations, we have compared various features of expectations of this group of agents with features of analogous expectations in the euro area (Łyziak 2003) and in the Czech Republic (Kokoszczyński, Łyziak and Stanisławska 2006).

The aim of this study is to deepen the understanding of the formation process of consumers' inflation expectations by conducting cross-country comparisons and by using a wide set of indicators of consumer inflation expectations in European economies. The paper is focused on two issues. Firstly, we develop the analytical framework for assessing reliability of various measures of consumer inflation expectations (i.e. probability measures quantified on the basis of qualitative survey data, measures derived from quantitative survey question, balance statistics describing the distribution of responses to the qualitative survey question). Secondly, using measures classified as reliable we examine their three features, namely forecasting accuracy, causality between the actual future inflation and expectations as well as their long-run convergence to the actual future inflation with respect to which they are formed.

Various features of European consumers' inflation expectations have been already analysed in the literature, however these works focused on the euro area (Forsells and Kenny 2000, 2004; Mestre 2007) or on selected member states of the European Union (Berk 2000; Berk and Hebbink 2006; Forsells and Kenny 2006). The novelty of our study lies in its completeness: we analyse cases of 27 economies and the euro area as a whole using various measures of consumers' inflation expectations. The paper follows our previous study on European consumers' inflation expectations (Łyziak and Stanisławska 2006 b), in which we examined the impact of current inflation on inflation expectations – a problem directly related to the credibility of monetary policy conducted by central banks (Table 1 summarizes the results of this study).[1]

1. Survey measures of consumers' inflation expectations and their reliability

In this study we employ various measures of European consumers' inflation expectations, obtained from surveys designed both in a qualitative and quantitative manner. Such variety of sources and indices allows us to assess, apart from cross-country differences, sensitivity of outcomes to the measurement method.

[1] Limited sensitivity of inflation expectations to changes in the current inflation constitutes one of conditions of anchoring inflation expectations (Berk 2006).

At the first place we analyze measures derived from qualitative surveys in which respondents declare expected direction and intensity of price changes during next 12 months, without providing exact numbers. The data source is the Consumer Survey conducted by the European Commission[2], which covers all the EU countries, although with samples starting at different points of time.[3] The survey question is formulated in the following way: *„By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months? They will: (a_1) increase more rapidly; (a_2) increase at the same rate; (a_3) increase at a slower rate; (b) stay about the same; (c) fall; (d) don't know"*. For Poland we employ an additional survey – carried by Ipsos – which has similar construction but covers longer period (since 1992). The survey data is next quantified with the probability method, in order to obtain the so-called objectified and subjectified measures of inflation expectations.[4] In line with the logic of the survey question, the resulting measures of expected inflation are a function of the structure of responses to the survey question and the perception of current inflation (scaling factor), to which respondents compare anticipated price changes. In the case of the objectified measure it is assumed that respondents perceive current price movements through official inflation statistics, thus the most recently published consumer price index is used as the current inflation rate. Another solution is to use an index of subjective inflation perception, which can be obtained from an additional survey question on current price level in comparison to the price level year ago. Such a question is included in the European Commission Consumer Survey and has the following form: *"In your opinion, is the price level now compared to that twelve months ago: (a_1^p) much higher; (a_2^p) moderately higher; (a_3^p) a little higher; (b^p) about the same; (c^p) lower; (d^p) difficult to say"*. Inflation expectations' measure calculated in this way is called subjectified.

Quantification results show that both versions of the probability method provide similar approximations of consumer inflation expectations in a major part of European economies. Measuring the uncertainty of our estimates we calculate average absolute differences between subjectified and objectified measures of inflation expectations, expressing them as a percent of average inflation. Such indicator is lower than 10% in the case of 13 economies, including: France, the Czech Republic, Belgium, United Kingdom, Germany, the Netherlands, Sweden, Latvia, Ireland, Luxembourg, Poland, Denmark and the Economic and Monetary Union (EMU) as a whole (Table 2). In Hungary, Italy, Portugal, Cyprus and Slovakia our measurement uncertainty indicator exceeds 10% only slightly. Remaining economies are characterized by more significant ambiguity in measuring inflation expectations with the wedge between both probability measures equal approximately 15-20% of average inflation in Spain and Romania, 20-30% in Estonia, Bulgaria, Slovenia and Finland, and more than 30% in Malta, Greece, Lithuania. The uncertainty indicator for Austria reaches its maximum of 51.5%.

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[2] More details about the survey can be found in EC (2007).
[3] The longest survey started in January 1985. However, in order to operate on samples of comparable length, all observations before January 1995 were omitted. For most of new member states of the European Union the samples start in 2001.
[4] The probability quantification method used to obtain measures of consumer inflation expectations analysed in this study is described in detail inter alia in Łyziak (2005) and Łyziak and Stanisławska (2006 a).

In our analysis we additionally refer to balance statistics, defined as differences between (weighted or unweighted) proportions of respondents to the survey question. Admittedly they do not measure inflation expectations directly, but at the same time they are not influenced by the assumptions imposed in quantification methods. In our study we use balance statistics both of consumer inflation expectations and inflation perception. The latter ones are needed to assess reliability of quantified measures of inflation expectations. Five balance statistics are employed. The first two are unweighted statistics: BS_1 (BS_1^p) is a difference between proportions of respondents expecting (noticing) increase in prices and their decrease, i.e.:

$$BS_1 = a_1 + a_2 + a_3 - c\,,\ BS_1^p = a_1^p + a_2^p + a_3^p - c^p\,, \tag{1}$$

while BS_2 (BS_2^p) is a difference between proportions of respondents expecting (noticing) increase in prices and their stabilisation or decrease, i.e.:

$$BS_2 = a_1 + a_2 + a_3 - b - c\,,\ BS_2^p = a_1^p + a_2^p + a_3^p - b^p - c^p\,. \tag{2}$$

The third balance statistics, BS_3 (BS_3^p), is a weighted one frequently used (e.g. Del Giovane and Sabbatini 2004, 2005; ECB 2002, 2003, 2005), attaching weight 1 to the proportion of respondents expecting prices to increase at faster rate (perceiving that the prices now are much higher than twelve months ago), ½ to those claiming that prices will increase at the same rate (are moderately higher), 0 to those declaring that prices will decrease at slower rate (are a little higher), -½ to the fraction of respondents expecting (declaring) stabilisation of prices and -1 to those expecting (noticing) their fall:

$$BS_3 = a_1 + \frac{1}{2}a_2 - \frac{1}{2}b - c\,,\ BS_3^p = a_1^p + \frac{1}{2}a_2^p - \frac{1}{2}b^p - c^p\,, \tag{3}$$

The fourth balance statistics, BS_4 (BS_4^p), is similar to the BS_3 (BS_3^p), but replaces its weights: 1, ½, 0, -½, -1 with the following ones: 3, 2, 1, 0, -1, i.e.:

$$BS_4 = 3a_1 + 2a_2 + a_3 - c\,,\ BS_4^p = 3a_1^p + 2a_2^p + a_3^p - c^p\,. \tag{4}$$

The fifth balance statistics, BS_5 (BS_5^p) – so-called Φ (Φ^p) statistics – summarizes the survey results in the way consistent with the normal distribution of the expected (perceived) inflation, as assumed in the probability quantification procedure. This indicator reflects the impact of the changes in the structure of responses to the survey question on the quantified measures of inflation expectations (perception) holding the current rate of inflation (a range of implied perceived price changes of the respondents claiming that prices are about the same relative to its level twelve months ago) constant.[5] In the case of inflation expectations the statistic is given by the formula:

$$BS_5 = \frac{Nz^{-1}\left(1 - \sum_{k=1}^{3} a_k\right) + Nz^{-1}(c)}{Nz^{-1}\left(1 - \sum_{k=1}^{3} a_k\right) + Nz^{-1}(c) - Nz^{-1}(1 - a_1) - Nz^{-1}\left(1 - \sum_{k=1}^{2} a_k\right)}, \tag{5}$$

[5] See Łyziak (2005) or Łyziak and Stanisławska (2006 a) for details.

In our analysis we additionally refer to balance statistics, defined as differences between (weighted or unweighted) proportions of respondents to the survey question. Admittedly they do not measure inflation expectations directly, but at the same time they are not influenced by the assumptions imposed in quantification methods. In our study we use balance statistics both of consumer inflation expectations and inflation perception. The latter ones are needed to assess reliability of quantified measures of inflation expectations. Five balance statistics are employed. The first two are unweighted statistics: BS_1 (BS_1^P) is a difference between proportions of respondents expecting (noticing) increase in prices and their decrease, i.e.:

$$BS_1 = a_1 + a_2 + a_3 - c\,,\ BS_1^P = a_1^P + a_2^P + a_3^P - c^P\,, \tag{1}$$

while BS_2 (BS_2^P) is a difference between proportions of respondents expecting (noticing) increase in prices and their stabilisation or decrease, i.e.:

$$BS_2 = a_1 + a_2 + a_3 - b - c\,,\ BS_2^P = a_1^P + a_2^P + a_3^P - b^P - c^P\,. \tag{2}$$

The third balance statistics, BS_3 (BS_3^P), is a weighted one frequently used (e.g. Del Giovane and Sabbatini 2004, 2005; ECB 2002, 2003, 2005), attaching weight 1 to the proportion of respondents expecting prices to increase at faster rate (perceiving that the prices now are much higher than twelve months ago), ½ to those claiming that prices will increase at the same rate (are moderately higher), 0 to those declaring that prices will decrease at slower rate (are a little higher), -½ to the fraction of respondents expecting (declaring) stabilisation of prices and -1 to those expecting (noticing) their fall:

$$BS_3 = a_1 + \frac{1}{2}a_2 - \frac{1}{2}b - c\,,\ BS_3^P = a_1^P + \frac{1}{2}a_2^P - \frac{1}{2}b^P - c^P\,, \tag{3}$$

The fourth balance statistics, BS_4 (BS_4^P), is similar to the BS_3 (BS_3^P), but replaces its weights: 1, ½, 0, -½, -1 with the following ones: 3, 2, 1, 0, -1, i.e.:

$$BS_4 = 3a_1 + 2a_2 + a_3 - c\,,\ BS_4^P = 3a_1^P + 2a_2^P + a_3^P - c^P\,. \tag{4}$$

The fifth balance statistics, BS_5 (BS_5^P) -- so-called Φ (Φ^P) statistics – summarizes the survey results in the way consistent with the normal distribution of the expected (perceived) inflation, as assumed in the probability quantification procedure. This indicator reflects the impact of the changes in the structure of responses to the survey question on the quantified measures of inflation expectations (perception) holding the current rate of inflation (a range of implied perceived price changes of the respondents claiming that prices are about the same relative to its level twelve months ago) constant.[5] In the case of inflation expectations the statistic is given by the formula:

$$BS_5 = \frac{Nz^{-1}\left(1 - \sum_{k=1}^{3} a_k\right) + Nz^{-1}(c)}{Nz^{-1}\left(1 - \sum_{k=1}^{3} a_k\right) + Nz^{-1}(c) - Nz^{-1}(1 - a_1) - Nz^{-1}\left(1 - \sum_{k=1}^{2} a_k\right)}, \tag{5}$$

[5] See Łyziak (2005) or Łyziak and Stanisławska (2006 a) for details.

able for Poland, Sweden, Hungary and the United Kingdom.[7] On the contrary to the EC Consumer Survey, these surveys are not harmonized and differ slightly in wording and frequency of conducting. This type of data is not affected by problems related to quantification procedure, but some empirical findings suggest that quantitative question might be too difficult for consumers and therefore harm reliability of the results.[8] The problem with such measures of inflation expectations is that in some of the economies considered (namely: Poland and Hungary) they are characterized by a large bias. As the bias is present also in inflation perception, it might be suspected that it is linked to the measurement error and an analogous design of quantitative questions concerning perception and expectations may support the hypothesis that errors from both questions are closely linked to each other. Therefore, assuming that the gap between respondents' subjective perception of price movements over last 12 months and current inflation measured by official statistics is fully attributable to the measurement errors, we can derive implied measurement errors related to quantitative (subjective) estimates of inflation expectations. The logic behind this transformation corresponds directly to the regression methods, which translate subjective projections into numbers consistent with official measures of inflation. In the first step, the relationship between the subjective perception of past price changes ($\pi^P_{s,t}$) and the relevant statistical indicators of past inflation (π_t) is examined:

$$\pi_t = \alpha + \beta \cdot \pi^P_{s,t} + \varepsilon_t, \tag{7}$$

In the second step, assuming that the same function transforms expected price movements as subjectively reported in the survey ($\pi^e_{s,t}$) into objectified measures of consumer inflation expectations (π^e_t), the latter indicators may be quantified:

$$\pi^e_t = \hat{\alpha} + \hat{\beta} \cdot \pi^e_{s,t} + \varepsilon_t, \tag{8}$$

The estimation results of the equation (7) are presented in Table 3.

2. Selected features of European consumers' inflation expectations

2.1. Forecast performance of survey measures of consumers' inflation expectations

Quantified measures of consumer inflation expectations are useful in testing the formation of expectations. In the first step we analyse the performance of inflation expectations measures as predictors of future inflation. We are interested whether consumers' predictions of future

[7] In the case of Poland we employ the GfK Polonia survey data, for Hungary – survey conducted by the National Bank of Hungary, for Sweden – the survey of the National Institute of Economic Research and for the UK – the Bank of England and NOP Inflation Attitudes Survey. In November 2002 the European Commission decided to introduce on experimental basis a quantitative question to the survey, but the data are unavailable.

[8] There is a rationale to believe that responses to quantitative questions involve greater uncertainty than in the case of qualitative questions (Jonung 1986). Moreover, respondents declare characteristic numbers: 0, 5, 10, 15, etc. (so called digit preference), often higher than official inflation statistics, and give answers inconsistent with their replies to the qualitative question. The problem of the reliability of quantitative survey questions, especially concerning Polish consumers, is addressed in Łyziak and Stanisławska (2006 a).

inflation are unbiased and how accurate they are in comparison with a naive forecast i.e. forecast equal to current (known) inflation (Table 4).

In majority of economies under consideration, consumers' absolute value of average forecast error does not exceed 2 p.p. There are exceptions, including direct measures of inflation expectations based on quantitative question in Hungary and Poland (bias of 9.1 and 12.6 p.p., respectively), consumers' inflation expectations in Romania (objectified measure), Hungary (objectified measure) and Poland (objectified measure quantified on the basis of Ipsos survey data), which overstated future inflation by 8.4, 3.4 and 3.4 p.p., respectively. In the period under consideration these three countries experienced large disinflation episodes (in the case of Romania it was as much as from 40% to 4.6%), which were not fully anticipated by consumers. Relatively sizeable errors were committed by consumers in Malta (-2.0 p.p. in the case of subjectified measure of expectations), Slovakia (2.0 p.p., objectified measure) and Greece (2.0 p.p., subjectified measure). On the contrary, the most accurate forecasts were formulated in Finland (subjectified measure: -0.1 p.p.), Poland (modified quantitative measure: -0.2 p.p.), Italy (subjectified measure: -0.2 p.p.), Sweden (objectified measure: -0.2 p.p.; subjectified one: -0.3 p.p.), and Lithuania (objectified measure: -0.3 p.p.). When the assessment of forecast accuracy is confined to common sample[9] (2001:05-2007:01), the results remain to large extent unchanged, with the exception of Poland (objectified measure quantified on the basis of Ipsos survey data), which performs much better, and Finland (subjectified measure), which performs relatively worse.

As the analysed countries experienced different inflation levels, it is useful to refer to relative forecasting accuracy indicators. In Sweden (both probability measures), the Czech Republic (both probability measures), Lithuania (subjectified measure) and Poland (all probability measures) expectational errors exceeded on average future inflation level. On the contrary, among the best performers were Belgium (both probability measures), the Netherlands (objectified measure), Ireland (objectified measure), Latvia (objectified measure) and the euro area (subjectified measure). The forecast accuracy statistics are summarized in Figure 1.

To assess the usefulness of consumers' expectations measures in predicting inflation, we compare them with naive forecasts in terms of forecasting accuracy. Therefore we conduct the modified Diebold-Mariano test, proposed by Harvey, Leybourne and Newbold (1997) on no difference in the accuracy of two competing forecasts, assuming loss function represented by mean square error. The results suggest that consumer inflation expectations have similar forecasting power as naive forecasts (Table 4). Only in few cases, namely: Denmark (objectified and subjectified measures), Greece (subjectified measure) and Malta (objectified measure), inflation expectations perform worse than naive forecast. On the contrary, in Poland the subjectified measure of inflation expectations outperformed naive forecast. However, it seems to result from specificity of the period considered (rise of inflation due to the Polish accession to the UE), as the alternative objectified measure (based on Ipsos survey)

[9] All inflation expectations' measures for Malta and the quantitative objectified measure for Poland are dropped from this comparison as these surveys cover even shorter period. Additionally, measures based on quantitative questions in Hungary and UK are excluded, as they have quarterly frequency and very few observations would be covered.

covering longer period is characterised by accuracy not significantly different from the naive forecast.

The presented results suggest that European consumers' inflation expectations are rather poor predictors of future inflation. Forsells and Kenny (2004, 2006) reach similar conclusion and point out that for the euro area as a whole the errors are smaller than for individual countries. Moreover, they notice improvement in forecast accuracy in the 90-ties. Mestre (2007) finds that probability measures of consumer inflation expectations perform much worse than forecasts based on autoregressive models. However they are not useless in forecasting as including them in autoregressive models improves their predicting power.

2.2. Testing for causality between actual future inflation and expected inflation

Even if the quantified measures of consumer inflation expectations in European countries seem to be imperfect predictors of future inflation, it may be the case that consumers use some pieces of information to gradually improve their expectations. Therefore the next test we apply concerns the causality between actual future inflation and inflation expectations. We follow the approach by Berk (2000), Berk and Hebbink (2006), Forsells and Kenny (2004, 2006) and estimate two-variable (expected and future actual inflation) vector error correction models (VECMs). The advantage of this approach is that it allows the interaction between inflation expectations and future inflation to run in both directions. Moreover, such models by Granger Representation Theorem provide additional information on the direction of causality (Engle and Granger 1987).[10]

The following testing procedure is applied. At the beginning cointegration between various measures of consumer inflation expectations and actual future inflation is tested using the Johansen procedure.[11] Next, for those pairs of variables which seem to be cointegrated, the VECM is estimated with the aim to test both the short- and the long-term causality. For those measures of inflation expectations which fail the cointegration test we conduct traditional Granger causality test. There is one important caution in the procedure applied, which might affect the results, namely a relatively small number of observations available for the new EU member states.

Table 5 presents the results of both types of causality tests. We use three measures of inflation expectations, i.e. objectified probability measure, subjectified probability measure and the balance statistic BS_3[12]. Results of the short-term analysis confirm the causality running from actual future inflation to objectified probability measures of consumer inflation expectations in almost all countries under consideration. There are only two exceptions, i.e. Belgium, and Italy. The remaining measures are to lesser extent influenced by actual future inflation – in the case of subjectified probability measure the causality runs from actual future inflation to

[10] Berk and Hebbink (2006) note that the traditional Granger causality tests pertain to causality in the short-term dynamic adjustment, while the ECM-based tests relate to causality in the long-term relationship, as emphasized by Ericsson et al. (1998).
[11] Lag length was chosen based on AIC and BC information criteria and the properties of the error term.
[12] BS_3 is included in our testing procedure more like experiment – in most cases there was no good VAR or no cointegration.

inflation expectations in Belgium, Finland and Sweden, while in the case of the balance statistic BS_3 – in Austria, Bulgaria, Cyprus, Germany, Latvia and Lithuania. The long-run causality tests' results are much more robust with respect to the quantification method applied. All the measures of consumers' inflation expectations occur to be caused by future inflation with the balance statistic BS_3 in Bulgaria, Poland and Slovakia being the exceptions. It suggests that European consumers' inflation expectations are to some extent forward-looking.

Test results suggest that the feedback from consumer inflation expectations to actual inflation is rather weak and statistically insignificant. In the long-term analysis the opposite holds for balance statistic BS_3 in Bulgaria, Poland, Romania and Slovenia, as well as for the subjectified probability measure of consumer inflation expectations in Italy and in the UK. In the short-term analysis there are more expectations' measures having influence on actual inflation, including: objectified probability measure in Belgium, France and Poland (Ipsos survey), Portugal, subjectified probability measure in Austria and balance statistic BS_3 in Latvia.

Our results are consistent with the findings by Forsells and Kenny (2006), who covered a longer sample period, i.e. 1986-2005 using the probability measure of expectations in the euro area and its main economies.

2.3. Unbiasedness of consumer inflation expectations

An important feature of rational expectations is their unbiasedness. According to the rational expectations hypothesis, agents forming expectations use all information available and do not make systematic forecast errors, so their expectations are equal to the actual future inflation on average and to the actual future inflation plus a random forecast error period by period (Muth 1971, Lucas 1976)[13]. In line with the unbiasedness requirement, the coefficients β_0 and β_1 in the equation (9) should be equal to zero and one, respectively:

$$\pi^{e}_{t+n|t} = \beta_0 + \beta_1 \cdot \pi_{t+n} + \varepsilon_t , \qquad (9)$$

where π_{t+n} denotes the actual inflation in period $t+n$, $\pi^{e}_{t+n|t}$ is the expectation of inflation at time $t+n$ formed at time t, while ε is a white-noise error.

However there are theoretical doubts[14] concerning the assumptions of the rational expectations hypothesis, which may lead to inflation expectations bias, at least in the short run. Results of numerous empirical studies suggest that inflation expectations of consumers do not fulfil the unbiasedness requirement.[15] For this reason instead of testing the unbiasedness

[13] It should be noted that the problem of expectations' rationality had been introduced to the literature well before Muth (1971) and Lucas (1976) contributions. Keuzenkamp (1991) notices that Tinbergen (1932) had defined expectations' rationality in terms of the consistency of their formation process with the true economic relationships.

[14] The prominent role here is played by sticky-information models. Mankiw and Reis (2002) suggest that because of costs of acquiring information and/or of price reoptimization pricing decisions are not always based on current information. Another important input here, developed by Reis (2005) and Sims (2005), suggests that the process of acquiring and processing information that is an important part of forming inflation expectations by economic agents should be in itself treated as an outcome of rational (optimizing) behavior.

[15] E.g.: Bakhshi and Yates (1998) – inflation expectations of the UK employees, Mestre (2007) - consumer inflation expectations in the euro area, Forsells and Kenny (2004, 2006) – consumer inflation expectations in the euro

condition in its canonical form, we apply a test of the long-run convergence of inflation expectations to actual future inflation. Such a convergence takes place if the coefficients α_1 and α_2 of the following equation:

$$\pi^e_{t+n|t} = \alpha_1 \cdot \pi^e_{t+n-1|t-1} + \alpha_2 \cdot \pi_{t+n} + \varepsilon_t, \qquad (10)$$

add to one. Moreover, the lower is α_1, the faster is the convergence process. It should be noted that the equation (10) allows verifying inflation expectations' unbiasedness by testing the hypothesis that the coefficient α_1 and α_2 are equal to zero and one respectively. According to estimation results (Table 6), consumer inflation expectations in all countries do not fulfil this condition, however in majority of analysed economies expectations converge to the actual inflation ex-post in the long run. The speed of convergence is relatively low and diversified between different measures of expectations. In the case of objectified probability measures the estimate of α_1 varies from approximately 0.88 in Slovakia to 0.98 in Denmark. It corresponds to the number of months needed to absorb 50% of deviations of expectation from the long-run level (half-life of deviations) equal, respectively, 6 and 43. Half-life deviation estimates for subjectified probability indicators of inflation expectations are between 3 (Italy) and 39 months (Lithuania), while for quantitative ones – between 6 (Poland) and 36 months (Sweden).

Conclusions

Theoretical developments concerning the role of inflation expectations in economic relationships make empirical analysis in this area particularly needed. In this study we used survey measures of consumer inflation expectations in European economies, which were quantified with different methods. Before using these measures in testing selected features of consumer inflation expectations we introduced a scheme of assessing their reliability.

The following conclusions can be drawn from the empirical part of our paper:

- Firstly, the forecasting accuracy of quantified measures of consumer inflation expectations in Europe is rather poor and comparable to accuracy of naive forecasts.
- Secondly, the paper provides evidence for the long-run causality running from the actual future inflation to consumer inflation expectations, while the assessment of causality in the short-term dynamics depends on the measure of expectations applied. The impact of actual future inflation on inflation expectations suggests that consumers are to some extent forward-looking.
- Thirdly, although the unbiasedness condition of rational expectations is not fulfilled in any economy under consideration, the majority of measures demonstrate the long-run convergence toward the actual future inflation, with respect to which they are formed. It may

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are and its main economies, Łyziak (2005) – consumer inflation expectations in Poland, Kokoszczyński, Łyziak, Stanisławska (2006) – consumer inflation expectations in Poland and the Czech Republic.

mean that a kind of learning process takes place, but according to our estimation results its speed, diversified across countries, seems to be rather slow on average.

The results presented in this study may be useful in selecting those measures of consumer inflation expectations, which perform well in terms of their leading properties with respect to the actual future inflation and as such should be embodied in monetary authorities' information sets. It should be noted however that there are still many areas in empirical economy of inflation expectations, which need to be covered by analysis. Development of theoretical concepts combined with problems in measuring consumer inflation expectations provide incentives to assess existing approaches more rigorously and look for other methods of extracting this unobservable variable from consumer surveys and consumer behaviour.

Figures and Tables

Table 1. The impact of current inflation on consumers' inflation expectations (Łyziak and Stanisławska 2006b)[1]

	Impact of the increase / decrease of the current inflation on inflation expectations			
	Long-run determinant of inflation expectations			
	objectified probability measure	subjectified probability measure	quantitative measure	balance statistics Φ[2]
Austria	weak / weak	strong / null		weak
	-	*current inflation*		
Belgium	weak / weak	null / null		strong
	-	-		
Czech Republic	strong / strong	null / null		null
	-	-		
Denmark	weak / weak	weak / null		strong
	-	-		
EMU	weak / weak	null / null		strong
	future inflation	*future inflation*		
France	weak / weak	null / null		weak
	-	-		
Germany	weak / strong	null / weak		strong
	-	-		
Hungary	strong / strong	null / null	null / strong	null
	current inflation	-	-	
Ireland	weak / weak	null / weak		weak
	-	*current inflation*		
Italy	strong / strong	strong / strong		strong
	future inflation	*future inflation*		
Netherlands	strong / strong	null / null		null
	current inflation	*future inflation*		
Poland	strong / strong	null / null	null / null	weak
	-	-	-	
Portugal	weak / strong	null / null		null
	future inflation	*future inflation*		
Slovakia	strong / strong	null / strong		null
	-	-		
Spain	weak / weak	null / null		weak
	future inflation	-		
Sweden	strong / strong	weak / weak	null / null	null
	current inflation	*future inflation*	*future inflation*	
UK	weak / weak	null / null	null / null	strong
	future inflation	*future inflation*	-	

[1] The study is in Polish only. Detailed explanations available on request.
[2] The balance statistics Φ used in this study is consistent with the BS_5 described in the present paper.

Table 2. Usefulness of probability measures of inflation expectations

Country [sample]		Measurement uncertainty[1]	Usefulness of objectified measures of expectations		Usefulness of subjectified measures of expectations		Probability inflation expectations' indices to be used
			Spearman BS_1^P-π_o	Spearman BS_3^P-π_o	Spearman BS_1^P-BS_5^P	BS_5^P relative volatility to BS_1^P relative volatility, %	
Austria	[1995:10 - 2007:01]	51.5	0.3145*	0.3079*	0.9724*	1.37	both
Belgium	[1995:01 - 2007:01]	1.8	0.3976*	0.4575*	0.9132*	2.48	both
Bulgaria	[2001:05 - 2007:01]	25.5	0.1893	0.1889	0.9223*	3.47	-
Cyprus	[2001:05 - 2007:01]	11.9	-0.2719*	0.1277	0.1952	2.77	-
Czech Republic	[2001:01 - 2007:01]	1.3	0.6932*	0.6763*	0.9761*	1.33	both
Denmark	[1995:01 - 2007:01]	7.4	0.6836*	0.6304*	0.9964*	1.02	both
EMU	[1995:01 - 2007:01]	9.1	0.4129*	0.4234*	0.9724*	2.09	both
Estonia	[2001:04 - 2007:01]	25.0	0.5368*	0.2054	0.8533*	4.67	objectified
Finland	[1996:07 - 2007:01]	27.8	0.2008*	0.1540	0.9564*	1.21	subjectified
France	[1995:01 - 2007:01]	0.1	0.5952*	0.6057*	0.9631*	18.24	objectified
Germany	[1995:01 - 2007:01]	4.2	0.1801*	0.2246*	0.9335*	5.96	-
Greece	[1995:01 - 2007:01]	32.5	0.0677	-0.0099	0.7992*	2.31	subjectified
Hungary	[1995:01 - 2007:01]	10.4	0.6896*	0.8715*	0.8081*	13.70	objectified
Ireland	[1998:03 - 2007:01]	5.4	0.6353*	0.6019*	0.8542*	3.66	objectified
Italy	[1995:01 - 2007:01]	10.5	0.5600*	0.4415*	0.9250*	2.19	both
Latvia	[2001:05 - 2007:01]	5.1	0.7801*	0.8118*	0.8684*	5.82	objectified
Lithuania	[2001:05 - 2007:01]	36.1	0.8445*	0.8479*	0.9491*	1.80	both
Luxembourg	[2002:01 - 2007:01]	5.8	-0.128	0.0775	0.4342*	5.20	-
Malta	[2002:11 - 2007:01]	32.0	0.1533	0.5408*	0.7894*	2.50	both
Netherlands	[1995:01 - 2007:01]	4.4	0.6273*	0.2849*	0.9136*	3.21	objectified
Poland	[2001:05 - 2007:01]	6.7	0.7118*	0.7321*	0.9073*	2.17	both
Portugal	[1997:01 - 2007:01]	11.2	0.5768*	0.2505*	0.7625*	4.29	objectified
Romania	[2001:05 - 2007:01]	19.0	0.4346*	0.6040*	0.5949*	5.06	objectified
Slovakia	[2000:04 - 2007:01]	12.3	0.6784*	0.7199*	0.9282*	5.96	objectified
Slovenia	[1996:03 - 2007:01]	25.7	0.0267	0.4695*	-0.0024	2.87	objectified
Spain	[1995:01 - 2007:01]	15.0	0.3644*	0.4214*	0.9574*	3.47	objectified
Sweden	[1995:10 - 2007:01]	4.8	0.7513*	0.7393*	0.9934*	1.00	both
United Kingdom	[1995:01 - 2007:01]	3.1	0.3935*	0.3793*	0.7368*	1.08	both

* denotes significance on 5% level.
[1] Average absolute difference between subjectified and objectified measure of expectations relative to average inflation, in %.

Table 3. Transformation formulas of expectations measures based on surveys with quantitative questions in Poland and Hungary

Country [sample]	α	β	R^2
Poland [2003:05 - 2007:01]	-1.390 (0.576)	0.301 (0.056)	0.58
Hungary [2000q01 - 2006q04]	-6.494 (0.861)	0.702 (0.047)	0.86

Newey-West standard error in parentheses

Table 4. Forecast performance of inflation expectations measures

Country/measure		Individual samples					Common sample [2001:05 - 2007:01]			
		ME (p.p.)	MAE (p.p.)	MAPE (%)	RMSE (p.p.)	HLN-DM test stat.(1)	ME (p.p.)	MAE (p.p.)	MAPE (%)	RMSE (p.p.)
Austria	- objectified [1995:10 - 2007:01]	-0.5	0.8	42.5	1.1	0.30	-0.2	0.7	36.7	0.9
	- subjectified [1995:10 - 2007:01]	0.4	1.1	92.8	1.4	1.39	0.9	1.0	65.4	1.1
Belgium -	objectified [1995:01 - 2007:01]	-0.6	0.9	52.1	1.1	1.25	-0.5	1.0	55.6	1.2
	- subjectified [1995:01 - 2007:01]	-0.6	0.8	43.3	1.0	0.16	-0.4	0.7	37.8	0.9
Czech Rep.	- objectified [2001:01 - 2007:01]	0.4	2.1	348.2	2.6	0.59	0.4	2.2	372.8	2.6
	- subjectified [2001:01 - 2007:01]	0.6	1.9	381.7	2.4	-0.42	0.6	1.9	408.7	2.5
Denmark	- objectified [1995:01 - 2007:01]	-1.1	1.2	55.2	1.3	3.16**	-0.7	0.9	50.1	1.1
	subjectified [1995:01 - 2007:01]	-1.0	1.0	48.0	1.2	2.56*	-0.6	0.8	42.7	0.9
EMU	- objectified [1995:01 - 2007:01]	-0.5	0.6	30.7	0.8	1.58	-0.7	0.7	33.0	0.8
	- subjectified [1995:01 - 2007:01]	-0.3	0.5	24.3	0.6	0.11	-0.4	0.5	24.0	0.6
Estonia	- objectified [2001:04 - 2007:01]	0.6	2.2	129.4	2.5	0.15	0.6	2.2	131.0	2.5
Finland	- subjectified [1996:07 - 2007:01]	-0.1	0.9	126.3	1.1	-0.87	0.7	0.8	210.4	0.9
France	- objectified [1995:01 - 2007:01]	-0.5	0.6	47.2	0.8	1.10	-0.6	0.6	30.5	0.7
Greece	- subjectified [1995:01 - 2007:01]	2.0	2.2	64.9	3.1	2.76**	1.5	1.7	53.5	2.2
Hungary	- objectified [1995:01 - 2007:01]	3.4	3.9	48.2	5.3	1.12	1.8	2.8	68.8	3.4
	- quantitative [2000:01 - 2006:04](2)	12.6	12.6	266.6	12.8	-	-	-	-	-
	- quantitative obj. [2000:01-2006:04](2)	0.7	1.9	38.8	2.0	-	-	-	-	-
Ireland	- objectified [1998:03 - 2007:01]	-1.0	1.5	41.3	2.0	-0.18	-0.7	1.1	39.7	1.3
Italy	- objectified [1995:01 - 2007:01]	-0.5	0.8	35.4	1.0	-0.27	-0.9	0.9	41.5	1.0
	- subjectified [1995:01 - 2007:01]	-0.2	0.6	24.7	0.7	-1.01	-0.5	0.6	27.6	0.7
Latvia	- objectified [2001:05 - 2007:01]	-1.0	1.5	39.2	2.0	-0.88	-1.0	1.5	39.2	2.0
Lithuania	- objectified [2001:05 - 2007:01]	-0.3	1.9	150.6	2.4	-1.04	-0.3	1.9	150.6	2.4
	- subjectified [2001:05 - 2007:01]	-0.4	2.2	151.0	2.3	-0.34	-0.4	2.2	151.0	2.3
Malta	- objectified [2002:11 - 2007:01]	-1.3	1.5	60.2	1.8	4.46**	-	-	-	-
	- subjectified [2002:11 - 2007:01]	-2.0	2.1	73.3	2.2	1.32	-	-	-	-
Netherlands	- objectified [1995:01 - 2007:01]	-0.4	0.8	32.3	1.1	0.48	0.0	0.8	38.0	1.0
Poland	- objectified [2001:05 - 2007:01]	0.5	2.2	191.5	2.6	-1.53	0.5	2.2	191.5	2.6
	- subjectified [2001:05 - 2007:01]	1.0	2.0	192.2	2.3	-2.29*	1.0	2.0	192.2	2.3
	- objectified (Ipsos) [1995:01 - 2007:01]	3.4	4.5	126.2	5.6	1.86	0.8	2.3	208.2	2.7
	- quantitative [2003:05 - 2007:01]	9.1	9.1	693.3	9.8	-	-	-	-	-
	- quantitative obj. [2003:05 - 2007:01]	-0.2	1.4	78.3	1.8	-	-	-	-	-
Portugal	- objectified [1997:11 - 2007:01]	-0.3	0.9	30.3	1.3	0.78	0.2	0.7	26.0	0.9
Romania	- objectified [2001:05 - 2007:01]	8.4	8.4	63.2	10.6	1.31	8.4	8.4	63.2	10.6
Slovakia	- objectified [2000:04 - 2007:01]	2.0	4.4	102.5	2.3	0.92	1.2	4.1	105.9	1.9
Slovenia	- objectified [1996:03 - 2007:01]	1.2	1.8	33.3	5.0	1.20	1.4	1.6	37.7	4.6
Spain	- objectified [1995:01 - 2007:01]	-1.0	1.1	36.7	1.3	1.15	-1.0	1.2	35.2	1.3
Sweden	- objectified [1995:10 - 2007:01]	-0.2	1.0	273.4	1.3	-0.11	0.1	0.8	224.2	1.0
	- subjectified [1995:10 - 2007:01]	-0.3	0.9	253.4	1.1	-0.88	-0.2	0.8	203.9	0.9
	- quantitative [1995:10 - 2007:01]	0.7	1.0	314.9	1.3	0.05	0.8	0.9	238.4	1.2
UK	- objectified 1995:01 - 2007:01]	-0.6	1.1	47.8	1.3	0.80	-1.1	1.2	40.9	1.4
	- subjectified [1995:01-2007:01]	-0.7	1.0	41.1	1.2	-0.27	-1.2	1.3	46.2	1.4
	- quantitative [1999:04-2006:04](2)	-0.4	0.7	33.1	0.9	-	-	-	-	-

ME - mean error; MPE - mean percentage error; MAE - mean absolute error; MAPE - mean absolute percentage error; RMSE - root mean square error.

(1) Diebold-Mariano test statistics modification proposed by Harvey, Leybourne and Newbold (1997); */** indicates rejection of hypothesis of equal mean square error of inflation expectations and naive forecasts at 5% and 1% significance level, respectively.

(2) Quarterly data.

Table 5. Testing for causality between actual future inflation and expected inflation

	Measure of expected inflation:											
	objectified probability measure				subjectified probability measure				balance statistic BS_3			
	significance of π^e in equation for π		significance of π in equation for π^e		significance of π^e in equation for π		significance of π in equation for π^e		significance of π^e in equation for π		significance of π in equation for π^e	
	Chi-test	t-test on ECM	Chi-test	t-test on ECM	Chi-test	t-test on ECM	Chi-test	t-test on ECM	Chi-test	t-test on ECM	Chi-test	t-test on ECM
Austria	2.21	1.42	25.9**	3.99**	11.04**	0.70	3.04	3.26**	2.35	1.56	15.41*	3.51**
Belgium	46.20**	0.19	10.7	4.17**	7.03	-	18.50**	-	1.20	2.07	3.33	3.82*
Bulgaria									2.30	4.09**	19.81**	0.29
Cyprus									4.10	1.64	17.44**	4.36**
Czech Republic	0.53	0.27	32.22**	3.86**	2.25	0.15	1.42	3.04**	5.22	-	3.00	-
Denmark	3.45	-	9.50*	-	2.15	-	7.58	-	x	x	x	x
EMU	4.98	0.84	45.30**	4.26**	0.73	1.04	7.42	3.98**	11.26	-	7.40	-
Estonia	4.73	-	18.28**	-					7.50	1.84	1.43	3.96**
Finland					4.35	0.12	16.94**	3.68**	x	x	x	x
France	18.57**	1.41	34.23**	4.69**					x	x	x	x
Germany									12.59	-	21.00**	-
Greece					x	x	x	x	x	x	x	x
Hungary	0.11	9.16	40.97**	6.04**					x	x	x	x
Ireland	4.79	-	26.69**	-					x	x	x	x
Italy	2.13	0.63	10.42	3.90**	2.94	2.76**	3.66	3.19**	7.64	-	4.12	-
Latvia	5.17	-	18.13**	-					24.60**	-	11.96*	-
Lithuania	5.31	-	18.10**	-	0.60	-	2.62	-	2.71	-	15.00**	-
Luxembourg									1.92	0.17	0.19	4.95**
Malta												
Netherlands	x	x	x	x					x	x	x	x
Poland (Ipsos)[1]	8.86*	1.11	23.29**	6.34**					x	x	x	x
Poland (GfK)[2]	0.84	0.61	7.77**	5.04**	2.08	0.20	3.01	4.78**	0.41	2.42*	0.47	1.91
Portugal	20.51**	1.95	38.23**	5.05**					x	x	x	x
Romania	4.26	-	20.59**	-					5.19	2.99*	5.10	4.19**
Slovakia	4.26	0.45	23.74**	4.38**					13.30	3.81**	12.24	2.11
Slovenia	2.39	0.16	13.37**	3.76**					2.82	-	7.83	-
Spain	0.61	0.17	16.33**	3.38**					x	x	x	x
Sweden[3]	4.41	1.38	50.15**	3.22**	10.84	1.36	17.78*	4.07**	x	x	x	x
UK	3.82	0.77	17.98**	3.99**	3.62	1.73*	4.35	3.42**	4.56	-	6.04	-

** (*) indicates significance at 1% (5%), bolded numbers indicate causality between inflation expectations and future inflation*
"x" denotes that no satisfying VAR specification was found; "-" denotes that there is no cointegration;
(1) Sample: 1995-2006.
(2) Sample: 2001-2006.
(3) For the measure based on quantitative survey question, the statistics are respectively: 2.15*; 0.04; 0.80; 4.23**.

Table 6. Long-run convergence of expectations towards actual inflation

Country/measure		unrestricted estimates [1]		$H_0: [\alpha_1 + \alpha_2 = 1]$		restricted estimates [2]	speed of convergence [3]
		α_1	α_2	F-stat.	[p-val]	α	(no. of months)
Austria	objectified [1996:10 - 2007:01]	0.945***	0.044**	0.51	[0.48]	0.957***	13
	subjectified [1995:10-2007:01]	0.857***	0.158*	0.27	[0.61]	0.858***	5
Belgium	objectified [1995:01-2007:01]	0.945***	0.037*	0.73	[0.40]	0.968***	22
	subjectified [1995:01-2007:01]	0.911***	0.055**	4.00	[0.05]	0.966***	21
Czech Republic	objectified [2001:01-2007:01]	0.952***	0.033	0.20	[0.66]	0.937***	11 [4]
	subjectified [2001:01-2007:01]	0.932***	0.044	0.70	[0.41]	0.955***	- [4]
Denmark	objectified [1995:01-2007:01]	0.923***	0.037**	3.84	[0.05]	0.984***	43
	subjectified [1995:01-2007:01]	0.885***	0.061***	9.02	[0.00]	-	-
EMU	objectified [1995:01-2007:01]	0.940***	0.041***	2.63	[0.11]	0.976***	29
	subjectified [1995:01-2007:01]	0.951***	0.038***	2.98	[0.09]	0.974***	27
Estonia	objectified [2001:04-2007:01]	0.923***	0.080	0.01	[0.93]	0.923***	9 [4]
Finland	subjectified [1996:07-2007:01]	0.953***	0.045***	0.09	[0.77]	0.955***	16
France	objectified [1995:01-2007:01]	0.890***	0.073***	3.61	[0.06]	0.951***	14
Greece	subjectified [1995:01-2007:01]	0.752***	0.349***	12.30	[0.00]	-	-
Hungary	objectified [1995:01-2007:01]	0.915***	0.103***	1.16	[0.28]	0.943***	12
	quantitative objectified [2000:01-2006:04]	0.782***	0.229***	0.11	[0.74]	0.788***	12
Ireland	objectified [1998:03-2007:01]	0.962***	0.029	0.35	[0.56]	0.974***	27 [4]
Italy	objectified [1995:01-2007:01]	0.915***	0.064**	1.58	[0.21]	0.941***	12
	subjectified [1995:01-2007:01]	0.766***	0.213***	1.45	[0.23]	0.783***	3
Latvia	objectified [2001:05-2007:01]	0.918***	0.086***	0.08	[0.78]	0.913***	8
Lithuania	objectified [2001:05-2007:01]	0.939***	0.068*	0.03	[0.87]	0.935***	11
	subjectified [2001:05-2007:01]	0.982***	0.018*	0.00	[0.99]	0.982***	39
Malta	objectified [2002:11-2007:01]	0.847***	0.093*	1.77	[0.19]	0.921***	9
	subjectified [2002:11-2007:01]	0.973***	0.018	0.03	[0.87]	0.985***	- [4]
Netherlands	objectified [1995:01-2007:01]	0.912***	0.075**	0.27	[0.61]	0.925***	9
Poland	objectified [2001:05-2007:01]	0.930***	0.048**	0.77	[0.39]	0.936***	11
	subjectified [2001:05-2007:01]	0.916***	0.077***	0.10	[0.75]	0.917***	8
	objectified (Ipsos) [1995:01-2007:01]	0.903***	0.104**	0.10	[0.75]	0.911***	8
	quantitative objectified [2003:05 - 2007:01]	0.886***	0.117***	0.01	[0.92]	0.884***	6
Portugal	objectified [1997:11 - 2007:01]	0.934***	0.064**	0.03	[0.86]	0.936***	11
Romania	objectified [2001:05-2007:01]	0.900***	0.131*	0.84	[0.36]	0.933***	10
Slovakia	objectified [2000:04-2007:01]	0.885***	0.104**	0.11	[0.74]	0.883***	6
Slovenia	objectified [1996:03 - 2007:01]	0.888***	0.128***	1.47	[0.23]	0.907***	8
Spain	objectified [1995:01-2007:01]	0.947***	0.035***	2.69	[0.10]	0.982***	39
Sweden	objectified [1995:10-2007:01]	0.926***	0.039	1.68	[0.20]	0.949***	- [4]
	subjectified [1995:10-2007:01]	0.942***	0.027**	3.11	[0.08]	0.973***	26
	quantitative [1995:10-2007:01]	0.962***	0.040**	0.04	[0.86]	0.962***	36
United Kingdom	objectified [1995:01-2007:01]	0.958***	0.030*	1.29	[0.26]	0.974***	27
	subjectified [1995:01-2007:01]	0.917***	0.055***	5.50	[0.02]	-	-
	quantitative [1999:04-2005:04]	0.885***	0.104**	0.48	[0.49]	0.906***	32

[1] Estimates of parameters of equation: $\pi^e_{t+12|t} = \alpha_1 \cdot \pi^e_{t+1|t-1} + \alpha_2 \cdot \pi_{t+12}$; OLS estimators; Newey-West standard errors in parentheses;

[2] Estimates of parameters of equation: $\pi^e_{t+12|t} = \alpha \cdot \pi^e_{t+1|t-1} + (1-\alpha) \cdot \pi_{t+12}$; OLS estimators; Newey-West standard errors in parentheses;

[3] Half life of expectations' deviation from REH

[4] As in some economies coefficients α_1 and α_2 add to unity but coefficient on future inflation is statistically insignificant, an additional test was conducted on restricted estimates. If the null hypothesis of α being equal to 1 is not rejected, as it happened for subjectified measure in the Czech Republic, Malta and objectified measure in Sweden, it is concluded that there is no convergence to actual future inflation. In the case of objectified measure in the Czech Republic, Estonia and Ireland this hypothesis is rejected at 5% significance level.

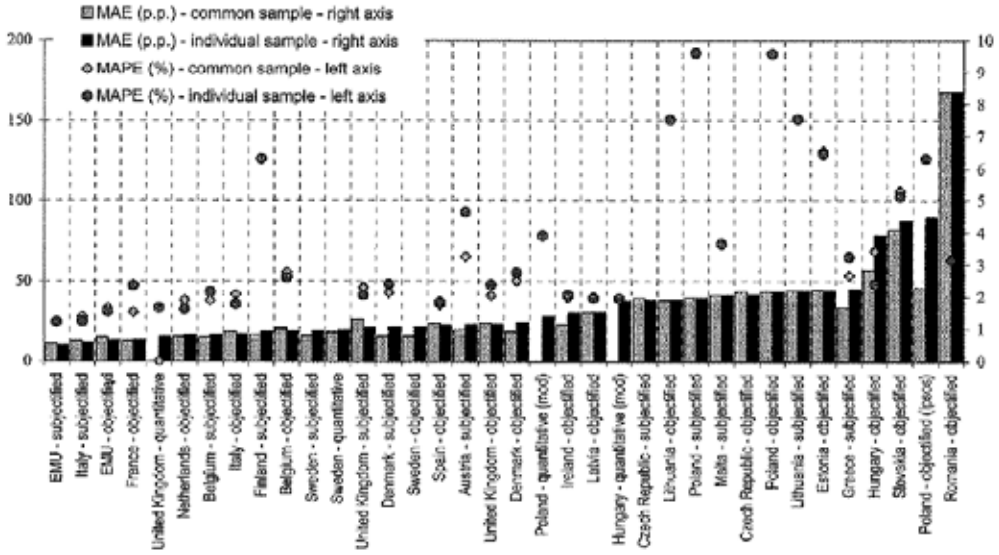
Table 7. Summary of results

Country/measure		Forecast performance		Long run convergence		Does future inflation influences inflation expectations...	
		ME (p.p.)	RMSE (p.p.)	Does it converge to actual inflation?	Speed of convergence	in short term?	in long term?
Austria	- objectified [1995:10-2007:01]	-0.5	1.1	Yes	13	Yes	Yes
	- subjectified [1995:10-2007:01]	0.4	1.4	Yes	5	No	Yes
Belgium	- objectified [1995:01-2007:01]	-0.6	1.1	Yes	22	No	Yes
	- subjectified [1995:01-2007:01]	-0.6	1.0	Yes	21	Yes	-
Bulgaria	- objectified [2001:05-2007:01]	x	x	x	x	x	x
	- subjectified [2001:05-2007:01]	x	x	x	x	x	x
Cyprus	- objectified [2001:05-2007:01]	x	x	x	x	x	x
	- subjectified [2001:05-2007:01]	x	x	x	x	x	x
Czech Republic	- objectified [2001:01-2007:01]	0.4	2.6	Yes	11	Yes	Yes
	- subjectified [2001:01-2007:01]	0.8	2.4	No	-	No	Yes
Denmark	- objectified [1995:01-2007:01]	-1.1	1.3	Yes	43	Yes	-
	- subjectified [1995:01-2007:01]	-1.0	1.2	No	-	No	-
EMU	- objectified [1995:01-2007:01]	-0.5	0.8	Yes	29	Yes	Yes
	- subjectified [1995:01-2007:01]	-0.3	0.6	Yes	27	No	Yes
Estonia	- objectified [2001:04-2007:01]	0.8	2.5	Yes	9	Yes	-
	- subjectified [2001:04-2007:01]	x	x	x	x	x	x
Finland	- objectified [1998:07-2007:01]	x	x	x	x	x	x
	- subjectified [1998:07-2007:01]	-0.1	1.1	Yes	16	Yes	Yes
France	- objectified [1995:01-2007:01]	-0.5	0.8	Yes	14	Yes	Yes
	- subjectified [1995:01-2007:01]	x	x	x	x	x	x
Germany	- objectified [1995:01-2007:01]	x	x	x	x	x	x
	- subjectified [1995:01-2007:01]	x	x	x	x	x	x
Greece	- objectified [1995:01-2007:01]	x	x	x	x	x	x
	- subjectified [1995:01-2007:01]	2.0	3.1	No	-	-	-
Hungary	- objectified [1995:01-2007:01]	3.4	5.3	Yes	12	Yes	Yes
	- subjectified [1995:01-2007:01]	x	x	x	x	x	x
	- quantitative objectified [2000:01 - 2006:04]	0.7	2.0	Yes	12	-	-
Ireland	- objectified [1998:03-2007:01]	-1.0	2.0	Yes	27	Yes	-
	- subjectified [1998:03-2007:01]	x	x	x	x	x	x
Italy	- objectified [1995:01-2007:01]	-0.5	1.0	Yes	12	No	Yes
	- subjectified [1995:01-2007:01]	-0.2	0.7	Yes	3	No	Yes
Latvia	- objectified [2001:05-2007:01]	-1.0	2.0	Yes	8	Yes	-
	- subjectified [2001:05-2007:01]	x	x	x	x	x	x
Lithuania	- objectified [2001:05-2007:01]	-0.3	2.4	Yes	11	Yes	-
	- subjectified [2001:05-2007:01]	-0.4	2.3	Yes	39	No	-
Luxembourg	- objectified [2002:01-2007:01]	x	x	x	x	x	x
	- subjectified [2002:01-2007:01]	x	x	x	x	x	x
Malta	- objectified [2002:11-2007:01]	-1.3	1.8	Yes	9	x	x
	- subjectified [2002:11-2007:01]	-2.0	2.2	No	-	-	-
Netherlands	- objectified [1995:01-2007:01]	-0.4	1.1	Yes	9	Yes	Yes
	- subjectified [1995:01-2007:01]	x	x	x	x	x	x
Poland	- objectified [2001:05-2007:01]	0.5	2.6	Yes	11	Yes	Yes

Country/measure		Forecast performance		Long run convergence		Does future inflation influences inflation expectations...	
		ME (p.p.)	RMSE (p.p.)	Does it converge to actual inflation?	Speed of convergence	In short term?	In long term?
	- subjectified [2001:05-2007:01]	1.0	2.3	Yes	8	No	Yes
	- objectified (Ipsos) [1995:01-2007:01]	3.4	5.6	Yes	8	Yes	Yes
	- quantitative objectified [2003:05-2007:01]	-0.1	1.8	Yes	6	-	-
Portugal	- objectified [1997:01-2007:01]	-0.3	1.3	Yes	11	Yes	Yes
	- subjectified [1997:01-2007:01]	x	x	x	x	x	x
Romania	- objectified [2001:05-2007:01]	8.4	10.6	Yes	10	Yes	-
	- subjectified [2001:05-2007:01]	x	x	x	x	x	x
Slovakia	- objectified [2000:04-2007:01]	2.0	2.3	Yes	6	Yes	Yes
	- subjectified [2000:04-2007:01]	x	x	x	x	x	x
Slovenia	- objectified [1996:03-2007:01]	1.2	5.0	Yes	8	Yes	Yes
	- subjectified [1996:03-2007:01]	x	x	x	x	x	x
Spain	- objectified [1995:01-2007:01]	-1.0	1.3	Yes	39	Yes	Yes
	- subjectified [1995:01-2007:01]	x	x	x	x	x	x
Sweden	- objectified [1995:10-2007:01]	-0.2	1.3	No	-	Yes	Yes
	- subjectified [1995:10-2007:01]	-0.3	1.1	Yes	26	Yes	Yes
	- quantitative [1995:10-2007:01]	0.7	1.3	Yes	38	No	Yes
UK	- objectified [1995:01-2007:01]	-0.6	1.3	Yes	27	Yes	Yes
	- subjectified [1995:01-2007:01]	-0.7	1.2	No	-	No	Yes
	- quantitative [1999:04-2006:04]	-0.4	0.9	Yes	8	-	-

"x" denotes that given measure of inflation expectations is considered as unreliable.

Figure 1. Forecast performance statistics



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（三） Can a Multi-sectoral Design Improve Indicator-based Forecasts of the GDP Growth Rate: Evidence form Switzerland

Michael Graff

Can a multi-sectoral design improve indicator-based forecasts of the GDP growth rate? Evidence from Switzerland

Brisbane and Zurich, March 2007

Abstract

This paper presents a multi-sectoral composite indicator for the Swiss GDP growth rate, targeting a lead of two quarters. The in-sample period ranges from 1991 to 2002 and 14 data points are reserved as out of sample to assess the forecasting performance. The results appear promising, in terms of both phase and amplitude. Comparisons with two other uni-sectoral composite leading indicators for the same reference series – the traditional KOF barometer as published until March 2006 and a uni-sectoral composite indicator computed from the same indicators as the multi-sectoral instrument – show that the new approach is superior to the alternatives, which is due to both its broader information basis as well as to the structure that is imposed by the multi-sectoral design. Yet, there are pronounced differences regarding the accuracy of the sectoral forecasts, so that there is scope for improvement.

JEL-Classification: E37

Keywords:

Business cycles; composite indicators; sectoral disaggregation; principle components; real time simulations

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Can a multi-sectoral design improve indicator-based forecasts of the GDP growth rate? Evidence from Switzerland

1 Introduction

The multi-sectoral composite indicator for the Swiss business cycle that is documented in this paper is a result of a pre-study for the replacement of the traditional KOF[1] barometer, as published until March 2006, with a newly designed instrument, combining 22 indicator series in a multi-sectoral design. The in-sample database for this exercise comprises the period from 1990 to 2002. Out of sample, we can refer to quarterly GDP data until 2006q2, so that there are 14 data points for evaluation.[2]

The traditional KOF barometer is a natural benchmark for the new instrument. In addition to this, a uni-sectoral composite indicator will be constructed that allows isolating the effect of the multi-sectoral structure. Since the targeted lead for the three forecasting instruments is two quarters, their performance can be directly compared.

Appropriate attention will be devoted to the so-called "end-point problem". Real time forecasts at the right margin of a series often differ considerably from those that one obtains ex post, i.e. after adding additional data points have been added. A comparison between a reference series and ex post forecasts can therefore give an overly optimistic impression of the actual usefulness of the forecasting instrument in real time. We shall therefore perform a number of real time simulations that reflect those forecasts that were – or would have been – provided for practical purposes at the time of their first release.

The reference series for the composite indicators is the annual real growth rate of the quarterly GDP series published by the Swiss Federal Statistical Office (SFSO) after the last revision, which takes place two years after the first release.[3] The in-sample data are hence final in the sense that they are not going to be revised, at least as long as the underlying definitions do not change. Out of sample, the SFSO GDP data for 2003 have now undergone its conventional revision cycle. For 2004 and 2005, however, the SFSO data are still provisional, and the most recent data points referred to in this paper, 2006q1 and 2006q2, are estimates released by the Swiss State Secretariat for Economic Affairs (Seco) resulting from indicator models.

Given this, we shall refer to the last available values of the reference series, i.e. to final values until 2003q4, then to the provisional SFSO data and finally to the last two Seco estimates.[4]

The reference series as well as the composite leading indicators that are going to be compared are summarised in table 1.

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1 KOF stands for "Konjunkturforschungsstelle" (Swiss Institute for Business Cycle Research) at ETH Zurich.

2 The analysed data set is available from the author upon request.

3 The definitions are based on the European System of Accounts (ESA 95), which since 2004 also constitutes the framework for the official Swiss GDP statistics (see Bundesamt für Statistik 2003). Note that ESA 95 records real growth rates as chain indices referring to prices of the previous year.

4 Some studies refer to the first provisional values of a reference series throughout to ensure uniformity over the whole sample period; see e.g. ARTIS (1996). However, this should be a last resort in when a forecasting instrument aims at a reference series that undergoes changes in definition through time, so that the initially published provisional data are a shortcut to ensure congruence of forecasted and reference series. Normally, as long as the provisional data are informationally efficient in the sense that the expected value of future revision is zero, a leading indicator targeting provisional data would not aim at the "true" series, but rather at its best estimate that will eventually become available, i.e. the final data, together with the revisions to the provisional data releases. However, if the expected value of the latter equals zero, the target series will in fact be the former. Furthermore, as long as the official provisional data are the best forecasts of the final data available in real time, they constitute the proper reference series for out-of-sample evaluations, even when this implies that these analyses may be subject to future revisions.

Table 1: Reference series and composite leading indicators

Reference series (quarterly data)	New composite indicators (quarterly data)		Traditional composite indicator (monthly data)
Annual real GDP growth rate	Multi-sectoral composite indicator (22 indicator series)	Uni-sectoral composite indicator (22 indicator series)	traditional KOF barometer (6 indicator series)
1991q1–2002q4 final data ($n = 48$)	Ex post data (in-sample)	Ex post data (in-sample)	Ex post data
2003q1–2006q2 4 final + 10 provisional data points ($n = 14$)	Ex post and real time data (out-of-sample)	Ex post and real time data (out-of-sample)	Ex post and real time data

Before we turn to the new multi-sectoral composite indicator, the next section will provide a brief description of the traditional KOF barometer as well as of its shortcomings that triggered the development of a new leading indicator for the Swiss business cycle.

2 The traditional KOF barometer

The traditional KOF barometer was developed in 1976. It was slightly revised in 1998 and published for the last time in April 2006. According to the press statements, it was to be interpreted as a qualitative indicator for the development of year-on-year growth rate of value added (acceleration or slowdown of GDP growth). The construction of this barometer relied on the identification of indicator series for which cross correlations identified a stable lead before the reference series.[5] Six indicators were selected,[6] low pass filtered, and from the filtered series, the first principle component was computed. The resulting principle component, a standardised variable, was updated monthly and published without further transformation.[7]

Due to gradual changes to of the economic links and patterns, indicator models that are designed to forecast economic developments based on observed correlations in the past, tend to have a limited life span. The traditional KOF barometer is no exception, as in 2005, seven years after the last revision; the lead before the reference series had broken down again, so that the need for a further revision became apparent.[8] In addition, due to a growing database reflecting the Swiss business cycle, the traditional KOF barometer is no longer informational efficient.[9] Furthermore, in face of the new awareness of the end-point problem, the low pass

[5] For a comparable bivariate selection process, also see ETTER/GRAFF (2004) and GRAFF/ETTER (2005).

[6] These were three monthly time series from the KOF manufacturing industry survey (the annual change of incoming orders, the change of the order backlog compared to the previous month and the expected purchase of intermediate goods) as well as three quarterly series (the judgement of wholesale inventories, the real order backlog in the construction sector compared to the previous year and the evaluation of the financial situation in the coming 12 months from the Seco consumer sentiment survey). The qualitative items form from the KOF surveys were quantified as balance indicators (percentage plus less percentage minus).

[7] This, presumably, has to be understood as a precautionary measure, as the press statements always emphasised that the barometer should forecast the direction, but not the level of the GDP growth rate.

[8] In particular, when the monthly series of traditional KOF barometer is aggregated into quarterly frequency by taking the mean values over the months of a quarter, a cross correlogramme with the reference series covering 1991q1 to 2002q4 reveals the highest correlation when the series are synchronised.

[9] A multiple regression of the reference series on the traditional KOF barometer, advanced two quarters, and on the growth rate of real added value in the financial sector, yields a significantly positive coefficient for the barometer (1.15, $t = 7.32$). The coefficient for the financial sector, however, is also significantly positive

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filtering of the six input series was recognised as a potential problem. Finally, though only the standardised values from the first principle component were published, inferences about the expected growth rate were possible with the traditional KOF barometer as well,[10] so that limiting the interpretation to acceleration or slowdown of GDP growth was not imperative.

3 A multi-sectoral composite indicator

The objective of the development of the new indicator for the Swiss business cycle is to determine a quantitative composite indicator with a lead of around two quarters.

As for the traditional KOF barometer, the fundamental building blocks are the identification of theoretically valid indicators series with empirically established leads before the reference series and the aggregation of theses series into a composite indicator. Thus, we adopt the basics of the traditional approach, the quantification of a not directly measurable process by means of a bundle of indicators, which reflect the underlying process on the surface, as well as the extraction of the joint variance of the indicators as the first principle component. The essential innovation is that the business cycle is no longer modelled as a *one-dimensional* process but as a multi-dimensional phenomenon of sectoral business cycles, which are modelled separately as sectoral first principle component of sectoral bundles of indicators and subsequently aggregated into the overall business cycle.[11]

The choice of the three sectoral modules is based on the consideration that it should be particularly useful to identify those sectoral cycles that are characterised by pronounced deviations from the overall business cycle. Evidence on the relevance and distinctiveness of sectoral business cycles can be inferred from the annual data of the "industries production account", which is published by the SFSO. Table 2 shows the correlations of the annual growth rates of sectoral value added with the GDP growth rate up to the end of the in-sample period in 2002. The rows are ordered descending according to the average sector shares. The growth rates of the two largest sectors "industry, processing branch" and "trade and repair" correlate significantly positive with the overall business cycle. The third largest sector "public administration" is moving independently of the business cycle. Among the remaining sectors with a share of at least 5% in GDP, "real estate, rental, informatics, R&D", "financial intermediation" and "transportation and communications" correlate significantly positive with the overall business cycle, whereas "rental income of private households" and "health and social work" do not. The latter two sectors, like "public administration", evolve steadily along a long-term growth path. As they do not introduce variance into the overall business cycle, there is no need for independent modelling. The only other sector with a share in GDP of at least 5% that does not exhibit a pronounced co-movement with the overall business cycle is "construction" (NOGA 45)[12], where r = 0.23 does not indicate significant correlation with the growth rate of GDP.[13] For "financial intermediation" (NOGA 65), however, a separate mod-

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(0.28, t = 4.56), confirming that the available set of information is under-utilised. Notably, this method does not indicate inefficiency of the traditional KOF barometer regarding the construction sector; the respective coefficient is insignificant, the point estimate negative. However, this is an expected result, since the construction sector is already reflected in the traditional KOF barometer. Indeed, the negative point estimate can be attributed to the fact that the construction sector as one of six indicator series is rather over-represented; it share in Swiss GDP during the 1990s was five to 6%, which is far from 17% (1/6).

[10] The regression of the reference series R on the traditional KOF barometer B, advanced two quarters, transforming the traditional KOF barometer into the scale of the GDP growth rate, yields $R_t = 1.47 + 0.81\ B_{t-2}$.

[11] From other leading indicators for GDP known to us, such a "bottom up" approach is otherwise only implemented in the Economic Barometer of the German Institute for Economic Research (DIW) in Berlin. A significant difference, however, is that for estimates of data points at the right margin, the DIW refers to univariate sectoral time series methods, while we exclusively rely on indicator models.

[12] NOGA, the acronym used by the SFSO, stands for "Nomenclature Générale des Activités économiques".

[13] This is why the traditional KOF barometer included a series from the construction sector as one of six indicators. However, since no explicit sectoral modelling was performed, the construction sector cycle enters with a

elling does not seem to be warranted: the correlation with the overall cycle is r = 0.53, which is significant and comparatively high. Yet, according to international convention, value added of "financial intermediation" includes so-called "financial intermediation services indirectly measured" (FISIM), which, due to construction, are highly correlated with overall economic value added. After subtracting the FISIM from NOGA 65, the growth rate of value added of "financial intermediation" without FISIM, i.e. the independent financial sector business cycle, is no longer significantly correlated with the growth rate of GDP (r = 0.16). Now, though the average share of the financial sector without FISIM in the 1990s is only around 2% of GDP, compared to 8% including FISIM, the variance of the growth of financial intermediation is much higher without FISIM,[14] so that the financial sector, despite its comparatively low weight, is far from negligible for volatility of GDP growth. Accordingly, the sectoral business cycle of the financial sector will be modelled referring to value added *without FISIM*.

Table 2: Correlations of sectoral and GDP growth rates; sectoral shares in GDP

Industry	*r*	average share
Industry, processing branch	0.47	20.0%
Trade and repair	0.42	13.1%
Public administration	–0.02	10.3%
Real estate, rental, informatics, R&D	0.49	10.0%
Financial intermediation	0.53	8.0%
Financial intermediation without FISIM	0.16	2.0%
Rental income of private households	0.02	6.9%
Transport and communications	0.62	6.5%
Construction	0.23	6.3%
Health and social work	0.06	5.3%
Insurance and pension funding	0.22	4.0%
Hotels and restaurants	0.52	2.9%
Electricity, gas, steam and distribution of water	–0.56	2.7%
Other public and private services	0.42	2.6%
Agriculture, hunting, forestry, fishing and fish farming	0.62	1.9%
Education	0.12	0.7%
Mining and quarrying	0.24	0.2%

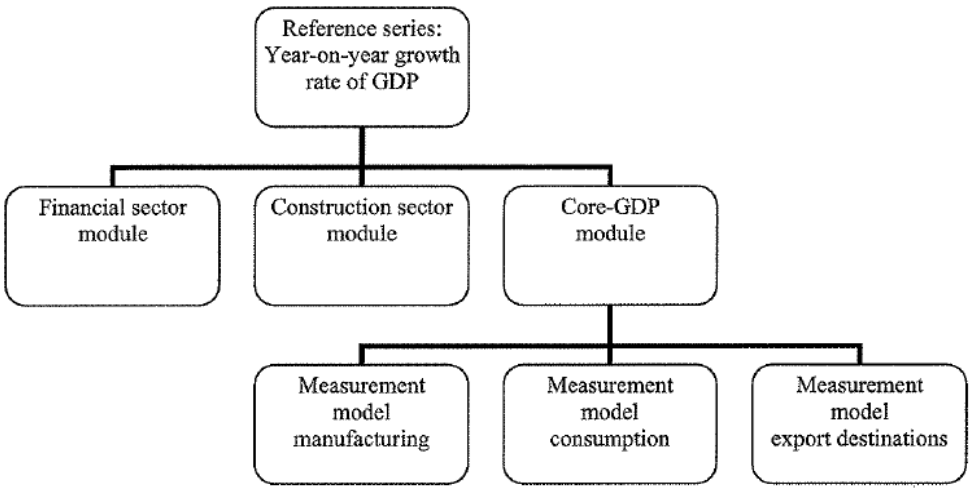
Average shares 1990–2002, growth rates 1991–2002, computed from SFSO "industries production account"

The multi-sectoral structure of the composite indicator resulting from these considerations is illustrated in figure 1. The overall business cycle, to be indicated with a lead of about two quarters, is reflected by the annual GDP growth rate. GDP is decomposed into three sectors, the financial sector, the construction sector and a residual comprising the remaining sectors (henceforth: "core-GDP"), so that the three sectors by construction add up to GDP. Furthermore, the core-GDP module, which comprises around 90% of GDP, though modelled as a one-dimensional process, is addressed with three different measurement models, which are all reflecting the Swiss core business cycle: manufacturing, consumer sentiment and the impulses emanating from economic conditions in the most important Swiss export destinations.

weight that is determined from the correlation matrix of the indicators. In contrast to this, the new multi-sectoral approach will consider the sectoral cycles according to their shares in GDP.

[14] The standard deviation of the annual growth rate of the quarterly series NOGA 45 (for which estimates have recently been published by the Seco) in is 10.9% (mean 3.2 %); after deduction of the FISIM the standard deviation jumps to 29.7 (mean 9.0 %). On the other hand, the standard deviation for the construction sector amounts to only 3.2% (mean –1.5 %), so that the contribution of this sector to variance of GDP growth is in fact less than that of the financial sector without FISIM.

Figure 1: The multi-sectoral structure



4 Modules

The general procedure is the same for all modules. The first task is to define and quantify the appropriate reference series, expressed in annual growth rates. The next step is a pre-selection of potential leading indicators. At this stage, the aim is to collect large sets of indicators from various sources, reflecting the sectoral cycles in as many facets as possible.

Before determining the subsets of indicators that finally enter into the sectoral modules, we have to conduct a series of transformations. As might be expected, some of the indicator series are affected by seasonality, and practically all series show evidence of noise. Regarding the latter, in contrast to the traditional KOF barometer, we shall not try to increase the signal-to-noise ratio by send the indicator series through a symmetrical low pass filter, since we acknowledge that the resulting revisions at the right margin would impair the practical usefulness of the new instrument. Moreover, if indicators that enter into the sectoral modules are measured independently, a considerable part of the noise should be taken care of by the principle component extractions that identify the common variance of the indicators, i.e. the sectoral cycles, rather than the noise and idiosyncrasies that are particular to specific indicators. Seasonality, however, needs to be addressed before extracting the principle components, as common seasonal patterns would be extracted along with the cyclical patterns. In particular, if the correlations stemming from seasonality dominate those that reflect the cycle, the first principle component will reflect the seasonality rather than the cycle. Hence, whenever a potential indicator series reveals significant seasonality, we apply the Census X11 seasonal filter.[15] Though symmetrical seasonal filters are also prone to revisions as new data points are added, reflecting gradual changes to the seasonal pattern, for long series the end-point problem is usually far less severe than with symmetrical low pass filters. Accordingly, the trade-off between a potential, albeit slight, instability at the right margin due to the seasonal filter on the one hand and the focus on cycle rather than seasonality on the other hand is clearly in favour of filtering, since otherwise a large number of potentially highly informative indicator series would have to be disregarded due to their seasonality.

Another transformation concerns the frequency of some of the pre-selected indicator series. Since the reference series is quarterly, we pre-selected only indicator series with quarterly or

[15] This concerns 12 of the 22 series that finally enter into the composite indicator.

higher frequency, resulting in an initial indicator set comprising quarterly and monthly data. Hence, the latter have to be aggregated into quarterly series. To this end, we could consider moving averages as well as reference to the values of a particular month of a quarter. Moving averages have the advantage of smoothing stochastic elements; however, since they are in fact simple symmetric low pass filters, we would need to take care that the lead of the indicator series is long enough to prevent asymmetry at the right margin. In contrast, the lead that is required on a monthly basis before aggregation into quarterly frequency is shortest when referring to the last month of a quarter. Since it is not obvious a priori which method of aggregation into quarterly frequency is appropriate, we aggregate the monthly series in four alternative ways: as averages over the three months of a quarter as well as by reference to the first, the second and the third month of a quarter only.

Furthermore, though economic indicators are usually quantitative data, the series from the KOF surveys are mostly qualitative (i.e. plus, minus and equal). For the traditional KOF barometer, these were quantified as balance indicators (percentage plus less percentage minus). For the new instrument, we shall consider the original percentage shares as well, so that the qualitative questions will be quantified by four series each (plus, equal, minus and balance).[16]

All potential indicator series X_t are then transformed into quarterly differences $(X_t - X_{t-1})$, as well as seasonal differences $(X_t - X_{t-4})$, since in some instances, differenced indicator series tend to have longer or more stable leads than levels.[17]

After these transformations, the set of pre-selected leading indicators is narrowed down by in-sample cross correlations of the indicators, referring to all transformations, with their sectoral reference series. On this basis, we identify the phase shift (lead, coincidence or lag) before the reference series that maximises the correlation in absolute terms. Then we sort the potential indicators by their lead in quarters (λ). After that, the set of potential indicators is limited to those where the highest correlation in absolute terms can be observed with a lead of the indicator series before the reference series of at least two quarters ($\lambda \geq 2$) and which at the same time satisfy the condition $|r| \geq 0.7$.[18]

The next step is to choose those transformations of the original series that at $\lambda \geq 2$ show the highest correlation with the reference series. This ensures that the information conveyed by the original series enters only once. The reduced indicator set is then ordered according to the (absolute) strength of the cross correlations and subjected to analyses regarding their content. In particular, all indicators series that have a close affinity to series that correlate higher with the reference series, while having the same lead, are discarded. The measurement model will thus reflect the sectoral cycle relating to substantially different surface phenomena.

The indicators are then synchronised according to their leads before the reference series. In particular, all indicators I are shifted according to their lead λ referring to lag the operator $L(I) = \lambda - 2$, which implies that only indicators with a lead of two quarters remain unchanged. After that, the variance of the synchronised leading indicators is collapsed into a sectoral composite indicator H^S as the first principle component, where the number of the leading indicators entering the principle component extraction is determined such that from the reduced list of potential indicators, starting with the three indicator series with the highest absolute cross correlations with the reference series, indicators are added one by one until we

[16] For a similar approach, see ENTORF (1993).

[17] See, amongst others, ETTER/GRAFF (2003), GRAFF/ETTER (2004) and GAYER (2005).

[18] When the resulting sets were empty, the search was extended to monthly indicators with a lead of down to four months, which were aggregated into quarterly series by referring to the first monthly value of the previous quarter. This concerns one of the 22 indicators that enter into the composite indicator. When this search still did not identify indicators satisfying the correlation cut-off criteria, the minimum lead was shortened to one quarter, which affected five of the indicators that were finally selected. The phase shift at the right margin resulting from this gradual "watering down" of the minimum lead requirement is analysed in section 6.

arrive at more than one principle component with an eigenvalue exceeding one, which would contradict the methodological a priori of one-dimensional sectoral cycles.[19]

Finally, the sectoral growth rates are estimated by synchronising the sectoral principle components H^i $(i = 1, 2, 3)$ according to their lead of two quarters before their reference series R^i and regressing the latter on the principle components H^i_{t-2}. Accordingly, the resulting point estimates P^i_t are the forecasts of the sectoral growth rates, i.e.

$$P^i_t = \beta_0 + \beta_1 H^i_{t-2}.$$

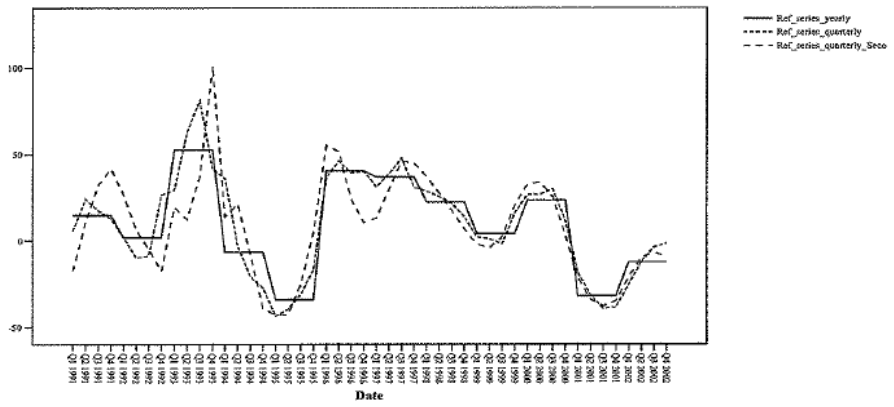
In the following three sections, we present the construction of the three modules in sample.

4.1 Financial sector module

For the construction of the sectoral reference series, the only official statistics available at the time of conducting this pre-study was the SFSO production account in yearly frequency. Accordingly, we had to break down the sectoral series into quarterly frequency. To this end, we searched for indicators series of at least quarterly frequency with close relationships to the level of value added in the financial sector.[20] These were then used to break down the yearly value added of NOGA 45 without FISIM from into quarterly value added, subject to the condition that the sum of the four quarters must be equal to the value of the corresponding year.[21]

Figure 2 shows the growth rates of the reference series based on the yearly data as well as our quarterly breakdown. The third series is the growth rate of the Seco's quarterly breakdown.[22]

Figure 2: Financial sector, reference series and quarterly breakdowns



Apparently, the two quarterly patterns are not identical, but they essentially reflect the same seasonal dynamics. Taking our quarterly breakdown of the SFSO yearly data as the references

[19] The variables entering into the principle components and their transformations are described in the appendix.

[20] Care was taken to use only coincident or lagging, but not potential leading indicators, for the quarterly breakdown of the reference series, since the indicators chosen for this purpose cannot at the same time be selected as leading indicators. Otherwise, the cross correlation based selection criteria could mistake variables as leading indicators, which replicate the reference series in the seasonal spectrum rather than in lower frequencies, since their seasonality is the same as that of the reference series by construction. For the financial sector module, we refer to the three quarterly indicators from the Swiss banking statistics; the revenue from (1) the interest spread, (2) fees for banking services and (3) commissions.

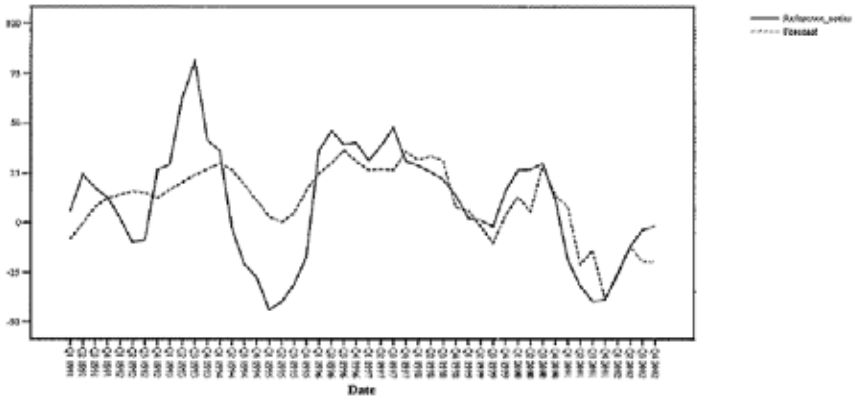
[21] For the quarterly breakdown, we used the software "EcoTrim", which is provided by Eurostat.

[22] These estimates were not available at the time of the in-sample computations. Here, they can hence serve to conduct plausibility checks for our quarterly breakdowns.

series, the stepwise selection procedure from the initial set of potential leading indicators produced a set of four items from the quarterly KOF survey in the banking sector. The lead of these indicators before the reference series is between one and two quarters.[23] However, the KOF banking survey was launched only in the beginning of the 2000; the selection process hence relies on relatively few data points, which implies a higher probability than otherwise that some of the selections may in fact be based on spurious correlations. We therefore perform a second selection, where we impose the condition that all potential indicators have to reach back to 1991. The second selection identifies three indicators relating to the domestic money supply, the domestic credit volume, and the Swiss share market. [24] This enables us to calculate a second principle component that is reaching back to the beginning of the in-sample period. To compute the sectoral leading indicator, the two principle components are synchronising due to their lead before the reference series and considered with a weight of ½ for years for which we could extract both principle components. For the earlier years, the longer component enters with a weight of one. Finally, we regress the module's reference series on the series resulting from two splined principal components, which delivers the sectoral indicator.

The result of these steps is shown in figure 3. Obviously, the fit is improving towards the end of the in-sample period, where we can refer to a broader database, which is encouraging as we construct this indicator for forecasts rather than for ex post calculations.

Figure 3: Financial sector, reference series R^i_t and ex post forecast $P^i_t(H^i_{t-2})t$



4.2 Construction sector module

For the construction of this module's reference series, we again have to break down the yearly data from the SFSO production account into a quarterly series.[25] Figure 4 shows the annual growth rate of the reference series based on yearly data for NOGA 45 along with our quarterly breakdown as well as the annual growth rate of the Seco's quarterly breakdown.

The quarterly patterns of the two disaggregations are similar for the last few years. Yet, for the initial years, both quarterly breakdowns are possibly too volatile, fluctuating strongly

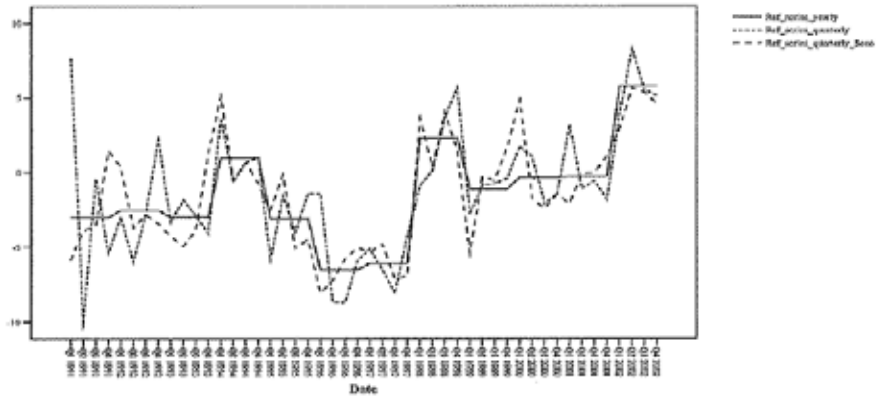
[23] The four series are the gross profit compared to the previous quarter ($\lambda = 2$), the demand for banking services from foreign customers compared to the previous quarter ($\lambda = 1$), the revenue from commissions compared to the previous quarter ($\lambda = 1$) and the volume of private assets compared to the previous quarter ($\lambda = 1$).

[24] The series are the growth rate of M2 compared to the previous year ($\lambda = 2$), the volume of credit outstanding ($\lambda = 7$) and the growth rate of the Swiss share market SPI index compared to the previous year ($\lambda = 1$).

[25] Here, we rely on the sales index for the construction sector, which is published in the SFSO "production, orders, sales and inventory" statistics. However, this series does not go back beyond 1996, so that for earlier years, we refer to data on construction activity collected by the Swiss Society of Constructors.

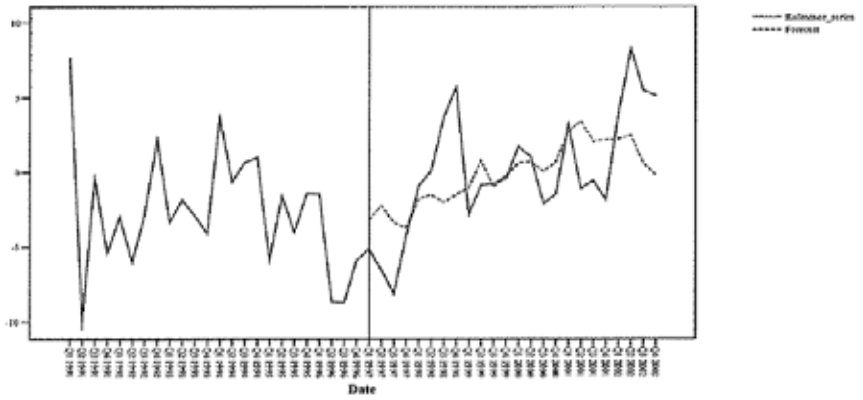
around the yearly series. In addition, the two quarterly series diverge strongly from each other during those earlier years. None of the two quarterly breakdowns is hence quite convincing for the earlier years. Nevertheless, since both approaches tend to converge towards the end of the in-sample period, it appears that the quality of the quarterly breakdown is improving, which would be important for forecasts of this series out of sample.

Figure 4: Construction sector, reference series and quarterly breakdowns



The leading indicators for the construction sector module that we arrive at through the step-by-step selection process are two items from the KOF survey in the construction sector and one item from the KOF planning sector survey.[26] The lead of these indicators before the reference series is four quarters. However, the two KOF surveys, from which we take the leading indicators, were only launched in the mid 1990s. For the time before that, this study did not identify any satisfactory leading indicators.[27] Hence, the sectoral principle component for the construction sector is only computed for years after 1996. We synchronise this principle component, with the reference series, regress the latter on the former and thus obtain the ex post forecasts for this module. The result is shown in figure 5.

Figure 5: Construction sector, reference series R^i_t and ex post forecast $P^i_t(H^i_{t-2})t$



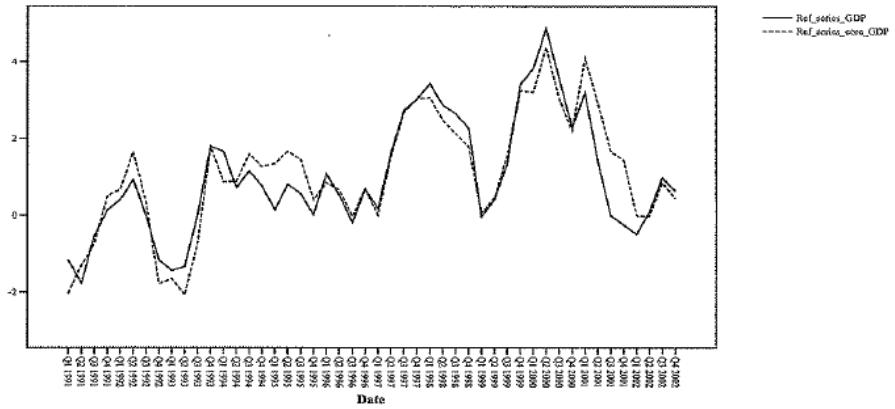
[26] The indicators are construction activity compared to the previous year ($\lambda = 4$), expected employment in the construction sector ($\lambda = 4$) and the order backlog in the planning sector in months ($\lambda = 4$).

[27] This may partly be due to the difficulty to construct a plausible quarterly reference series in the first place.

4.3 Core-GDP module

The reference series for the core-GDP module results as a residual from the previous steps. In particular, we deduct from the real growth rate of GDP the contributions of the other two modules, i.e. the sectors credit without FISIM and construction. The result is shown in figure 6, representing the growth rates of GDP and core-GDP.

Figure 6: Growth rate of GDP versus Core-GDP



Evidently, the two growth rates largely move together. Yet they are not quite the same; for example, there is a noticeable phase shift after the peak around the year 2000, i.e. after the burst of the IT share market bubble. Since this initially affected the financial sector more than the rest of the economy, the decrease in core-GDP comes with a delay.[28]

For this module, which represents about 90% of GDP, we construct three independent measurement models. Though fitted to the same reference series, core-GDP, they are designed to reflect different aspects of the data generating process. In particular, we focus independently on domestic manufacturing, domestic consumption and on external demand, fluctuating with the business cycle in the most important Swiss export destinations. Core-GDP is thus modelled as a one-dimensional process, reflected by a single reference series, but the sectoral forecast is based on three independent measurement models.

The step-by-step selection procedure for the domestic manufacturing measurement model results in a principle component of three leading indicators. The latter are items from the KOF survey in manufacturing, reflecting the expectations of the survey participants.[29] The lead of the principle component before the reference series for core-GDP is two quarters.

For the domestic consumption measurement model, we arrive at a first principle component of leading indicators from four different sources; two from the KOF hotel/restaurant survey, one from the KOF retail trade survey, two items from the Seco consumer confidence survey and one indicator from the import statistics provided by the Swiss Customs Office.[30]

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[28] Note that this finding has an important consequence. Based on the residual series of core-GDP, a search for leading indicators will tend to identify series that are relative insensitive with respect to the financial sector. This is desirable, since our multi-sectoral approach aims at capturing the financial business cycle separately and then to incorporate it into the overall indicator, weighted appropriately with the sector's share in GDP.

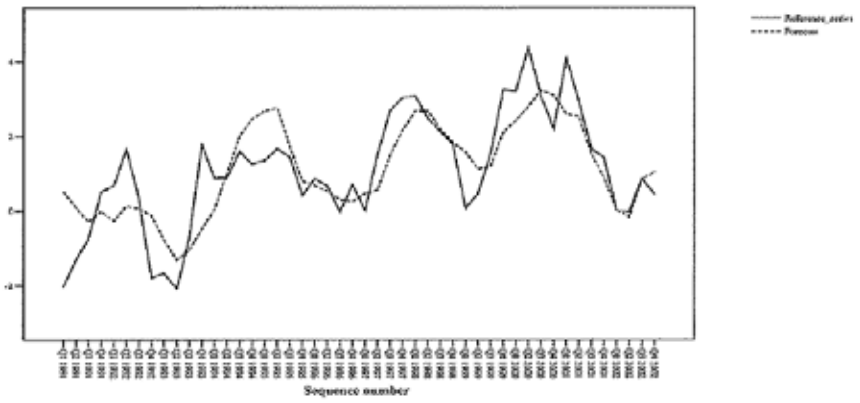
[29] The indicators are the expectations regarding incoming orders ($\lambda = 2$), production ($\lambda = 2$) and purchases of intermediate goods ($\lambda = 2$) in the following three months.

[30] The indicators are revenue compared to the previous year ($\lambda = 3$) and the change of the assessment regarding the level of employment compared to the previous year ($\lambda = 2$) in the hotel and restaurant industry, the change of expected sales in the retail trade non-food sector compared to the previous year ($\lambda = 2$), the expec-

The export destinations measurement model consists of the first principal component of three series that are taken from manufacturing business cycle surveys in some EU member states.[31]

To aggregate the measurement models for core-GDP we perform a secondary principle component analysis and extract the common variance of the three primary first principle components. Finally, we synchronise the sectoral indicator with the reference series and regress the latter on the former. The result of this two-step aggregation is presented in figure 7, showing reasonable in-sample fit.

Figure 7: Core-GDP, reference series $R^i{}_t$ and ex post forecast $P^i{}_t(H^i{}_{t-2})t$



5 In-sample analysis

Based on the results of the three modules, the forecasts of the sectoral reference series,[32] expressed as real annual growth rates on a quarterly basis

$$P^i = \beta_0 + \beta_1 H^i_{t-2},$$

we calculate the multi-sectoral composite indicator for the real GDP growth rate $P^{GDP}{}_t$ as

$$P^{GDP}{}_t = a^1{}_{t-1} P^1{}_t + a^2{}_{t-1} P^2{}_t + a^3{}_{t-1} P^3{}_t,$$

where the superscripts 1, 2 and 3 refer to the three sectoral modules, and a^1, a^2 und a^3 are their shares in Swiss GDP.[33]

Figure 8 shows the Swiss GDP growth rate along with the multi-sectoral composite indicator for the in-sample period 1991q1–2002q4, plotted with the targeted lead of two quarters before the reference series.

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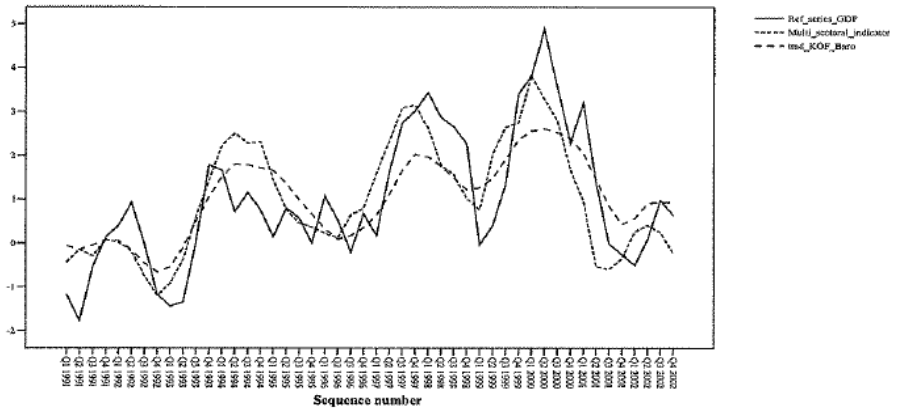
tations regarding the future economic situation ($\lambda = 2$) the assessment of the economic situation as favourable for larger purchases ($\lambda = 2$) as well as the annual growth rate of the passenger car import value ($\lambda = 1$).

[31] In order to extract the relevant information for Swiss exports from these surveys, we identify the five most important export destinations (the four neighbouring countries Germany, France, Italy and Austria as well as the United Kingdom) and calculate, on a yearly basis, the shares of these destinations in Swiss overall exports. With these shares, we weight the survey results from these countries. Stable leads before the growth rate of the Swiss core-GDP show up for the weighted European production expectations ($\lambda = 2$) and for the weighted European incoming orders during the preceding months ($\lambda = 1$). A third series with a stable lead is the change of the order backlog compared to the previous year in Germany ($\lambda = 2$).

[32] Due to the difficulty in estimating a plausible quarterly breakdown of NOGA 45 for the years before 1997 (see section 4.2), we calculate the pre-1997 growth rate for the construction sector directly from the yearly data reported in the SFSO production account.

[33] Since ESA 95 reports real growth rates as chain indices referring to previous year's prices, the sectoral shares for aggregation have to refer to year t–1 as well.

Figure 8: Reference series R^t_t and leading indicators P^{GDP}_{t-2}, multi-sectoral and traditional



To allow for a comparison with the traditional KOF barometer, we aggregate it into a quarterly series and scale it in terms of the GDP growth rate, which results in the third series in this graph. Obviously, the ex post performance of the new leading indicator is quite encouraging. It shows a stable lead and forecasts the level of the reference series with remarkable accuracy, especially for the later years of the in-sample period.[34]

Furthermore, compared to traditional KOF barometer, the new indicator clearly exhibits a superior ex post forecasting performance, which holds for both phase and amplitude. However, it remains an open question to which degree the improvement of the ex post forecasting performance can be attributed to the updated indicator selection, to the larger number of series that combine into the new composite indicator, or to its multi-sectoral design.

Let us hence examine in how far the major innovation of the new approach, the multi-sectoral design, affects the ex post forecasts. This design imposes structure on the indicators in allocating them to one out of three sectors that are weighted with their shares in GDP. Within sectors, the indicators are synchronised by a lag operator, relating to the leads of the sectoral indicators before the sectoral reference series. While the traditional KOF barometer refers to a similar lag operator, it reflects the sectoral diversity of the Swiss economy in a much less stringent manner. In particular, as the first principal component of six indicator series, it by design targets a one-dimensional process. Although the indicators reflect manufacturing, wholesale and construction, the financial sector is not represented at all. Moreover, no attempt is made to set the weights according to corresponding shares in GDP. Instead, the indicators contribute to the barometer with the loadings that result from the identification of the first principle component, i.e. according to their contribution to the common variance of the indicator set. Hence, the expected weight is 50% for manufacturing and one sixth each for construction as well as for the indicators relating to wholesale and consumer sentiment, where the two latter do not offer any clear sectoral interpretation. In fact, principle component analysis – usually applied as a heuristic method to reveal unknown structure – is not adequate to aggregate data where prior information on the structure of the data is available. The extraction of the first principle component from the indicator bundle is not informationally efficient, when it ignores available information on appropriate weights, implying informational inefficiency.

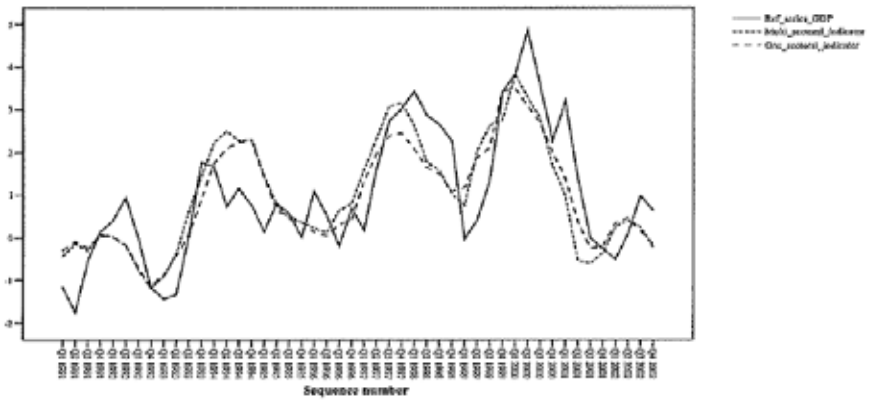
Due to these considerations, the new indicator is designed as a hybrid. We impose structure – the sectoral weights and the lag operators –, where we can refer to external information, but the weights within the modules and measurement models are determined heuristically from

[34] For the earlier years, the results are somewhat less convincing. This may be attributed to the fact that for this period, we have to rely on a limited number of indicators, which would impair the quality of the forecasts.

the data. Now, to check whether this structure improves the outcome, we would have to compute an alternative instrument, which refers to the same data, but does not impose the structure. Ideally, this would be a dynamic factor analysis[35] combining the same 22 indicators as the multi-sectoral instrument, where lag operator and weights are determined endogenously. Yet, due to the requirements regarding the data, we cannot conduct a dynamic factor analysis with the indicators chosen for the multi-sectoral instrument, since most series for the credit and construction sector only go back to the years 2000 and 1997, respectively. However, what we can do is to keep the lag operator in place and at the same time to abandon the sectoral structure by conducting a static principle component analysis and extracting the first component from the 22 indicators. Methodically, the resulting uni-sectoral indicator replicates the one-dimensional design of the traditional KOF barometer. Accordingly, a comparison of the uni-sectoral and the multi-sectoral indicators will identify the changes brought about by the sectoral structure.

To this end, figure 9 shows the reference series along with the in-sample forecasts resulting from the alternative composite indicators with the targeted lead of two quarters.

Figure 9: Reference series R^I_t and leading indicators $P^{GDP}{}_{t-2}(H_{t-2})$, uni- and multi-sectoral



Obviously, the multi-sectoral and the uni-sectoral composite indicators are rather similar. Yet, most of the time, the multi-sectoral indicator tends to show a longer lead before the reference series and to predict the level of the reference series with more accuracy. Interestingly, the uni-sectoral indicator tends to deviate more from the multi-sectoral indicator and to perform somewhat poorer in terms of both amplitude and phase during the later years of the in-sample period, for which both instruments refer to more information. The amplitude of the uni-sectoral indicator, for example, is clearly inferior at the cyclical peak around 1998, and after the year 2000, the lead is shorter. Figure 9 thus tends to indicate that the additional information imposed on the multi-sectoral instrument indeed improves the in-sample performance.

Before moving out of sample, let us examine whether the – informal – conclusions from the graphs are supported by corresponding statistics. These are reported in table 3. Obviously, the fit of the ex post forecasts to the reference series exhibits significant difference across sectors. The correlation coefficient of the forecast from the leading indicator with the reference series equals 0.79 in the core-GDP module, 0.67 in the financial sector module, but only 0.50 in the construction sector module.

[35] Dynamic factor analysis goes back to SARGENT/SIMS (1977) and GEWEKE (1977). Applications in the field of economic leading indicators are found, amongst others, in STOCK/WATSON (1999), FORNI ET AL. (2001), BANDHOLZ/FUNKE (2003) as well as in NIEUWENHUYZE (2005).

Table 3: Ex post forecasting performance, 1991q1–2002q4

	r	MAE	MAE/ SD	RMSE	RMSE/ SD	Theil's U
	Financial sector without FISIM and construction					
Financial sector without FISIM	0.67	16.6	0.57	21.6	0.74	0.71
Construction	0.50	2.75	0.68	3.43	0.85	0.87
	Core-GDP					
Two-step principle component	0.79	0.73	0.48	0.94	0.61	0.50
Measurement model manufacturing	0.77	0.77	0.50	0.97	0.63	0.52
Measurement model consumption	0.79	0.77	0.50	0.94	0.61	0.50
Measurement model export destinations	0.64	0.89	0.58	1.17	0.76	0.63
	GDP					
Multi-sectoral composite indicator (22 indicators)	0.77	0.79	0.51	0.96	0.63	0.53
Uni-sectoral composite indicator (22 indicators)	0.75	0.86	0.56	1.02	0.67	0.55
Traditional KOF barometer (6 indicators)	0.62	1.40	0.95	1.67	1.14	0.92

Since the new forecasting instrument has the same scale as the reference series, the table also report statistics that are sensitive to levels, the mean absolute error MAE $(\Sigma|R-P|)/n$ and the RMSE $\sqrt{(\Sigma(R-P)^2/n)}$, where R stands for the realised values of the reference series, P for the forecasts and n for the number of data points. The difference between MAE and RMSE is that the RMSE penalises larger errors. However, neither MAE nor RMSE consider the variance of the reference series, so that both would seem disproportionately high for the financial sector module. To allow comparisons between modules, we hence divide both MAE and RMSE by the standard deviation SD of the respective reference series. The last statistics is Theil's U, defined as $\sqrt{[(\Sigma(R-P)^2/n) / (\Sigma R^2/n)]}$. This coefficient compares a particular forecast to a random walk forecast. Values below one indicate superiority to the "naïve" forecast; a value of zero signals perfect match of forecast and realisation.

An inspection of the first three rows of table 3 confirms that the fit in the core-GDP module is best, followed by the financial sector module and finally the construction sector module. This probably reflects the lack of sufficiently long indicator series for the latter two modules. In addition, the construction sector module might suffer from the dubious quality quarterly breakdown of its reference series. For the core-GDP module and its measurement models, the

reported statistics consistently show that the fit of the measurement model consumption to the reference series is the best, followed by the manufacturing indicator bundle and finally by the measurement model related to export demand from Switzerland's major trading partners.[36] Furthermore, the two-step principle component, which summarises the three measurement models, exhibits the best forecasting properties. Although the correlation with the reference series is the same as in the best of the measurement models, and not higher, the remaining statistics consistently point to superiority of the more comprehensive measurement approach.

The last three rows of the table allow to compare the ex post forecasts of GDP growth two quarters ahead resulting from the multi-sectoral composite, the uni-sectoral indicator and the traditional KOF barometer. This comparison turns out straightforward; the multi-sectoral indicator is superior to the uni-sectoral indicator with respect to all reported statistics, and the latter is clearly superior to the traditional KOF barometer.

Concluding the in-sample analyses, let us examine whether the ex post forecasts of the multi-sectoral composite indicator are *significantly* superior to those of the uni-sectoral indicator and the traditional KOF barometer. In statistical terms, this amounts to a comparison of non-nested models. Let H_1 and H_2 denote two rival models $Y = g\,X_1$ and $Y = h\,X_2$.[37] Then, the J-test will evaluate whether the predicted value of an alternative model ($\hat{h}\,X_2$ or $\hat{g}\,X_1$) significantly improves the fit of the rival model in the two following regressions:

$$Y = g\,X_1 + \varphi\,(\hat{h}\,X_2) + \varepsilon_1,$$

$$Y = h\,X_2 + \tau\,(\hat{g}\,X_1) + \varepsilon_2.$$

The test statistics are the t-values for φ and τ. Significance of φ and at insignificance of τ implies rejection of H_1 by H_2. Significance of τ only means that H_2 is rejected by H_1. When neither φ nor τ is significant, the test does not offer any help in choosing the model. When both φ and τ are significantly different from zero, both models must be considered as deficient. Since our rival models are the different composite indicators, which are single time series, the J-test is here identical to the encompassing test (E-test), which consists of submitting g and h in

$$Y = g\,X_1 + h\,X_2 + \varepsilon$$

to t-tests. The decision rule equals that of the J-test. Now, according to this test, the new multi-sectoral composite indicator is indeed statistically significantly superior to the traditional KOF barometer in forecasting the real GDP growth rate ($t = 4.95$ versus $t = -0.98$), and the same holds compared to the uni-sectoral composite indicator that is based the same indicators ($t = 2.03$ versus $t = -0.05$).

Summing up the in-sample evidence, the new instrument is a considerably better leading indicator than both the traditional KOF barometer and an alternative indicator that does not impose sectoral structure on the same indicator set. This is certainly encouraging. The decisive assessment, however, is the forecasting performance out-of-sample.

6 Out-of-sample analysis

Out-of-sample forecast analyses are a straight-forward way to examine whether a comparatively good fit to a reference series in-sample is a result of "overfitting", which means that the underlying correlations between reference and indicator series do not reflect stable relationships but rather peculiar characteristics in-sample and hence break down out of sample.[38]

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[36] Yet, a correlation coefficient of 0.64, shows that no less than 40% of the variance ($0.64^2 = 0.41$) of the Swiss 1991–2002 core-GDP business cycle can ex post be reproduced with a few indicators from other European countries, confirming that important business cycle impulses for Switzerland stem from abroad.

[37] See DAVIDSON/MACKINNON (1981) and MIZON/RICHARD (1986).

[38] See CLARK (2004).

For our out-of-sample-analysis, at the time of conducting these computations, we were able to extend the GDP reference series with the quarters 2003q1 to 2006q2.[39] Though sectoral reference series are not required to compute out-of-sample forecasts from the multi-sectoral composite indicator, evaluations of the three sectoral out-of-sample-forecasts against some sectoral reference are useful to assess the strengths and weaknesses of the modules. To this end, we can construct out-of-sample reference series based on quarterly production account data that have meanwhile be estimated and published by the Seco.

Throughout these analyses, we need to be aware of the end-point problem. In particular, the out-of-sample analyses will be affected by this problem if the value that a variable $X(t)$ is assuming for a given quarter t is not time-invariant, so that $X(t)_t \neq X(t)_{t+z}$ $(z > 0)$.

This problem will not affect our references series, since we shall refer to data points of these series after 2002q4 merely to compare them with the respective out-of-sample forecasts. For the out-of-sample-regressions of the three sectoral reference series on the principle components, the regressands will be the same as in sample, covering the period from 1991q1 to 2002q4. Since these data points are final, there is no real time versus ex post end-point problem with respect to the reference series.

Regarding the indicator series as well as the principle components, however, the end-point problem matters. We are targeting a lead of two quarters, so that at any time t, the ex post series $X(t)$ is transformed into a forecast series $P(t+2)_t$. Accordingly, the first calculation of $P(t)$ is conducted in quarter $t-2$, and the end-point of the real time forecast series $P(t+2)_t$ at time t is identical with the end-point of the ex post forecast series. However, for all other data points the ex post series $P(t+2-z)_t$ is prone to differ from the real time series $X(t+2-z)_{t-z}$, where the latter represents the signal of the forecasting instrument that was (or would have been) available in real time, which is what forecasting instruments are constructed for. Now, assuming that data revisions are generally due to additional information, real time data can be expected to be less reliable than ex post data, so that an ex post indicator series would usually draw a too optimistic picture of its forecasting properties. Accordingly, for the out-of-sample evaluation, we should resort to the real time series $X(t+2-z)_{t-z}$.

How is the composite indicator affected by the end-point problem? Fortunately, data revisions proper are not a serious issue, since practically the entire 22 indicator series are taken from survey data that are not revised. Yet, even if the data are not revised at the source, we have to be aware of end-point problems that may be due to filtering.[40] In particular, forecasts that are based on leading indicators, which have been sent through symmetric low pass filters, may be highly problematic. The end-point, which is in the focus of interest, is prone to giving signals that differ substantially from the signal given later for the same point of reference, when more data points have been added and the filter has become symmetric. For the multi-sectoral composite indicator, we therefore do not low pass filter any of the indicators.[41]

Another source of revisions is that while the composite indicator is updated at regular intervals, the 22 indicator series will be updated at different stages in real time, due either to differences in the publication rhythm or to differences in their lead before the reference series. For the traditional KOF barometer, the missing end-points of single indicator series were filled by univariate extrapolations of the respective series, which may be problematical. In

[39] In particular, we refer to four final data points for 2003 and to ten provisional data points for 2004q1 to 2006q2; for details, see section 1.

[40] The profession has recently become increasingly aware of the filtering problem; see e.g. ORPHANIDES/VAN NORDEN (2002), GRAFF (2004), and TROY ET AL. (2007).

[41] As explained in section 4, 12 of the 22 series that enter into the composite indicator are affected by seasonality, which is purged by the Census X11 seasonal filter. In the long run, this filter may also lead to data revisions, as it adapts to potential changes in the seasonal pattern. However, the resulting revisions are trivial compared to those resulting from symmetrical low pass filters, and they are not focussed on the right margin of the series, so that the end-point instability due to the seasonal filter is negligible.

particular, if a trend continues, so that extrapolations are correct in retrospect, a phase shift is avoided. At inflection points, however, the opposite is true. Here, a continuation of the trend that proves wrong in hindsight causes a larger phase shift than if the last obtainable value would have been used to fill the missing value. Another option for dealing with missing end-points is to estimate missing values of single indicators from other series the have already been updated. This implies that the signals for the composite indicator at the right margin are extracted from a reduced set of information, which may impair the reliability of the forecasts, but an advantage is that a phase shift is avoided. The traditional KOF barometer did not resort to this option, but given the larger number of indicators combined into the new forecasting instrument, we shall implement it here.

A final source of subsequent revisions to the real time data of the composite indicator is aggregation by means of principle component extractions, a linear method, where the indicator loadings (weights) are computed from the indicator correlation matrix. As modifications of the sample will modify the correlation matrix, the loadings will change as well, affecting the values of the principle components across the entire sample.[42] For our purposes, the in-sample principle components for the composite indicator are calculated with up to 48 data points from ex post series that are ending in 2002q4. For the out-of-sample analyses, 14 data points for 2003q1–2006q2 are added, so that the out-of-sample real time series are based on the in-sample data plus an additional 1 to 14 data points, while the out-of-sample ex post series refer the in-sample data plus all subsequent 14 data points. For large samples, the change to the weighting scheme caused by a limited number of additional data points will be hardly be detectable. However as more and more observations are added, revisions to the principle components may eventually become perceptible. This source of revisions concerns the traditional KOF barometer as well as the multi-sectoral composite indicator. Furthermore, within the new instrument, the financial sector and the construction sector modules should be affected more than the core-GDP module, for which the indicators go further back in time, so that the 14 out-of-sample data points will have less impact on the modular correlation matrix.

To isolate these potential sources of revisions, the out-of-sample evaluation will be based on the following four versions of the forecasting instruments:

(1) Ex post composite indicators with all indicator series updated in October 2006 before the conducting the calculations for this paper and with principle component extractions for all H^i_{t-2} from 1991q1 (or the first available observation thereafter) up to 2006q2;

(2) quasi-real time composite indicators, referring to the same ex post data as above in (1), but with step-by-step principle component extractions that add one out-of-sample quarter after the other and save the resulting end-points as a quasi-real time series;

(3) real time composite indicators that are computed step by step from ex post vintages of the indicator series that had been available in real time, where missing end-points of the indicators with a lead of less than two quarters are filled continuing the last available values;

(4) real time composite indicators that are computed step by step from ex post vintages of the indicator series that had been available in real time, where missing end-points of the indicators with a lead of less than two quarters are estimated by multiple regression on those indicators, which belong to the same principle component and are already updated. If

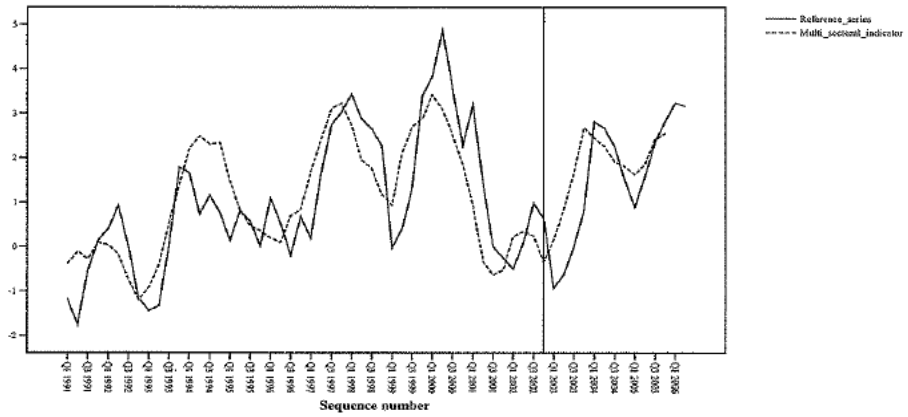
[42] It remains an open question whether revisions to the principle components improve or worsen the forecasting properties. An adaptation of the measurement model to changes in the data could in principle be a desirable characteristic. To enhance this feature, a "learning model" would compute principle components from relatively short sample period with a constant number of observations that is moving forward as time passes. On the other hand, one can get rid of this source of revisions by computing the loadings in sample and fixing them rather than running subsequent principle component analyses with an increasing number of observations. However, do to limitations of space, we shall leave theses simulations for another paper.

there are less then two such indicators,[43] we proceed as above in (3) and substitute the missing value with the last available observation.

The ex post composite indicator (1) can be expected to overstate the real time forecasting performance. Comparing the ex post indicator to the quasi-real time indicator (2) identifies revisions due to changing weights resulting from the fact that the principle components are computed from different samples. The real time composite indicators (3) and (4) are series comprising the end-points that would have been available in real time, where the difference is that (3) takes a more conservative stance regarding missing endpoints of individual indicator series, filling them by continuing the last available values, which may cause in a phase that is likely impair the lead, whereas (4) resorts to estimating missing end-point from updated indicators, which is likely to impair the amplitude, but to conserve the lead.

Let us first look at the multi-sectoral composite indicator computed ex post, which is shown in figure 10, along with the reference series, which is now extended out of sample up to 2006q2, where the vertical line visualises the end of the in-sample period. With its lead of two quarters, the forecasting instrument is plotted from 1991q1 to 2005q4.

Figure 10: Reference series and multi-sectoral composite indicator, ex post, 1991q1–2006q2



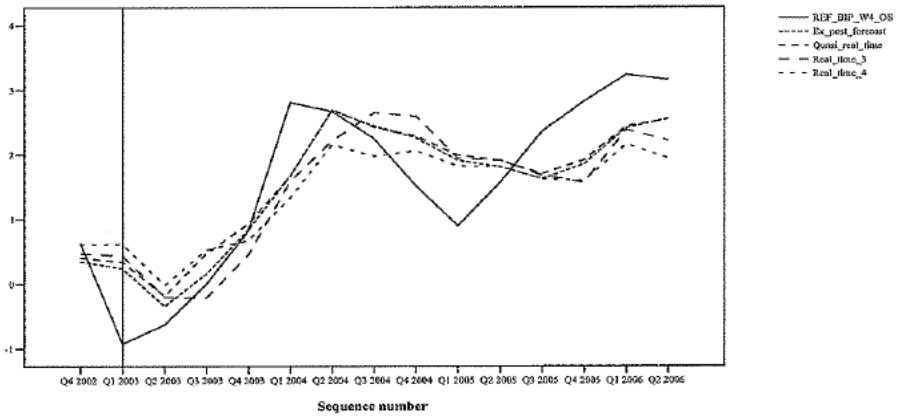
The forecasting performance is not perceivably worse out of sample than in sample; the lead remains stable and the levels of the reference series are predicted remarkably well. This is certainly encouraging, but – as discussed above – the ex post series is likely to overstate the accuracy of the instrument in real time. Let us hence now compare the out-of-sample forecasting accuracy of the ex post series with our three real time simulations.

To this end, figure 11 shows the 14 out-of-sample data points of the forecasts for the GDP growth rate, which result from the ex post series as well as from the three real time-alternative, where the vertical line indicates the first out-of-sample data point. Apparently, the ex post forecast results in the best fit to the reference series. Nevertheless, the quasi-real time series is almost identical to the ex post series, which implies that the revisions that are brought about by the changing sample size submitted to the principle component extractions are relatively minor. The quasi-real time series is also the only series for which – by construction – the last data point is identical to that of the ex post series. Although with increasing distance from the last data point, the deviations of the quasi-real time series from the ex post series tend to increase, the revisions are still marginal compared to those of the two real time series.

[43] This is the case for the financial sector module principle component that is based on short time series from the recently launched KOF survey in the banking sector.

Moreover, the real time series with missing end-points substituted for by the last available observations (3) does indeed show the expected phase shift and seems to fit the amplitude of the ex post series somewhat better than the real time series (4), for which missing indicator end-points are estimated from updated indicators, thus avoiding a systematic phase shift.

Figure 11: Reference series and forecasts, ex post versus real time, 2003q1–2006q2



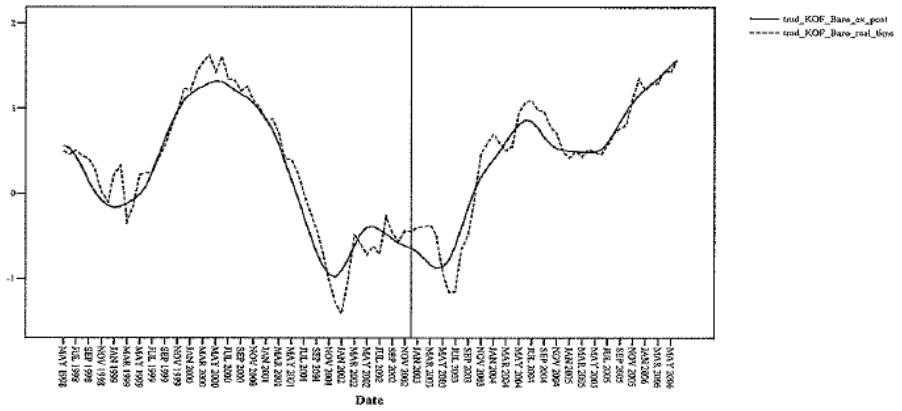
Cross correlating the reference series with the four alternative forecast series confirms the observations from figure 11. As table 4 shows, after advancing the forecasts according to their targeted lead, the ex post forecast series becomes a coincident indicator for the reference series, which corresponds to a lead of the multi-sectoral composite indicator of two quarters, and the ex post instrument provides the best forecast in terms of correlation. Moreover, the quasi-real time forecast is practically identical to the ex post forecast. For the real time forecast with missing end-points substituted for by the last available observations (3), we can also identify the expected phase shift in the cross correlogramme, which shows that in real time, this composite indicator would have a lead of one quarter rather than the targeted two. For the alternative real time specification with missing end-points estimated from updated indicators (4), the cross correlogramme is not conclusive as to whether in real time the lead would amount to one or two quarters. Yet, as expected, the phase shift is less pronounced when we estimate missing end-points rather than filling them with the last observed value. Accordingly, comparing the two specifications (3) and (4) that could indeed have been computed in real time delivers some empirical evidence that estimating missing values from updated variables should be the preferred option.

Table 4: Cross correlations, reference series and forecasts, 2003q1–2006q2

λ	Ex post (1)	Quasi-real time (2)	Real time (3)	Real time (4)
–3	–0.15	–0.14	–0.11	–0.10
–2	0.00	0.11	0.01	0.01
–1	0.48	0.49	0.38	0.44
0	**0.87**	**0.86**	0.78	**0.81**
1	0.82	0.81	**0.81**	**0.81**
2	0.45	0.44	0.57	0.48
3	0.06	0.08	0.17	0.18

How does the end-point problem affect the traditional KOF barometer? Figure 12 shows the corresponding ex post and real time series, which are reconstructed from the data published in the monthly press statements, covering the entire period from the last revision of the instrument to its the final published value for May 2006, when it was replaced by a new barometer.

Figure 12: Traditional KOF barometer, ex post and real time, 1998m5–2006m5



Obviously, the real time signals given by the traditional KOF barometer differ markedly from the ex post signals, and the difference is especially pronounced at inflection points.[44] This is most likely a result of two above-mentioned procedures: the smoothing of the six underlying indicators with a symmetric low pass filter and the extrapolation of missing end-points in real time. In hindsight, these features seem problematic, especially for an instrument with the declared objective to predict *inflection points* rather then the *level* of the GDP growth rate.

Let us now compare the post-2002 forecasting performance of the alternative composite indicators, the multi-sectoral and the uni-sectoral composite indicator as well as the traditional KOF barometer. Note that the latter has not been modified since 1998, so that the 14 quarters from 2003q1 to 2006q2 are out-of-sample domain for all three forecasting instruments.

Table 5 shows that the out-of-sample comparison between the alternative instruments turns out unambiguously. The multi-sectoral composite indicator is superior to the alternative uni-sectoral composite indicator with respect to all reported statistics, and the latter is superior to the traditional barometer, thus replicating the findings in sample.[45] Moreover, the table confirms that two the new indicators suffer markedly less from the end-point problem that plagued the traditional KOF barometer. For the latter, the ex post correlation of $r = 0.65$ would suggest a far better fit than the 0.51 achieved in real time. Compared to this, the difference in correlation between the ex post and the preferred real time specification (4) is relatively modest, which holds for both the multi-sectoral composite indicator (0.87 versus 0.81) and the uni-sectoral composite indicator (0.82 versus 0.77).

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[44] See STULZ (2005) for a similar conclusion.

[45] Regarding statistical significance, the multi-sectoral composite indicator is significantly superior to the traditional KOF barometer. The t-statistics are 4.04 versus –0.82 ex post and 4.10 versus –1.50 in real time, referring to specification (4). As can be expected according to table 5, the difference between the two new instruments is less pronounced. The t-statistics comparing the multi-sectoral composite indicator to the uni-sectoral composite indicator are 2.58 versus –1.51 ex post, 2.43 versus –1.35 in quasi-real time, 2.10 versus –1.51 in real time simulated with specification (3), and 1.62 versus –1.50 in real time simulated with specification (4). Note that only the last test fails to meet the conventional 5%-significance level. Yet, 14 data points constitute a very small sample, so that we would argue that the empirical evidence taken together clearly points towards superiority of the multi-sectoral structure.

Table 5: Out-of-sample forecasting accuracy, 2003q1–2006q2

	r	MAE	MAE/ SD	RMSE	RMSE/ SD	Theil's U
			Multi-sectoral indicator			
Ex post	0.87	0.56	0.40	0.68	0.49	0.32
Quasi-real time	0.86	0.61	0.43	0.70	0.50	0.33
Real time (3)	0.78	0.73	0.52	0.81	0.58	0.39
Real time (4)	0.81	0.75	0.54	0.84	0.61	0.40
			Uni-sectoral indicator			
Ex post	0.82	0.69	0.49	0.81	0.58	0.39
Quasi-real time	0.82	0.69	0.50	0.80	0.58	0.38
Real time (3)	0.74	0.80	0.58	0.90	0.65	0.43
Real time (4)	0.77	0.77	0.55	0.90	0.65	0.43
			Traditional KOF barometer			
Ex post	0.65	0.85	0.61	0.96	0.61	0.46
Real time (as published)	0.51	0.94	0.67	1.07	0.77	0.51

Now, recall that the multi-sectoral and the uni-sectoral composite indicator draw on the same indicator series, the only difference being that the former imposes a three-sectoral structure, whereas the latter does not. This implies that the superiority of the multi-sectoral instrument, which can be observed in sample as well as out of sample, must be attributed to the sectoral design. Of course, the question arises how well the three sectors perform before aggregation. Taking the quarterly data meanwhile published by the Seco to compute sectoral out-of-sample reference series, we shall now compare these with the three forecasts resulting from the modules. As before, we distinguish between forecasts based on ex post, on quasi-real time as well as on the two alternative real time simulations. The results are given in table 6.

The comparison of the three sectoral out-of-sample forecasts against their sectoral reference series reveals differences that are much more pronounced than in sample. In terms of correlation with the sectoral reference series, the core-GDP module performs best, with correlation coefficients for the ex post, quasi-real time and the two real time simulations ranging from 0.85 to 0.91, followed by the financial sector module ($0.61 \leq r \leq 0.81$). Notably, for the construction sector module, which already ranked lowest in sample, but still showed a significant correlation between forecast and reference series ($r = 0.50$), out of sample, the correlation completely breaks down ($-0.06 \leq r \leq 0.01$).[46] The MAE and the RMSE (after dividing them by the standard deviation of the reference series to the modular variance into account) as well as Theil's U confirm these findings. For the core-GDP module and the financial sector without FISIM, we get satisfactory, if not remarkable, out-of-sample forecasts, but for the construction sector, Theil's U is approaching unity, implying that we did not even outperform a random walk forecast.

[46] For the construction module, the real time simulations (3) and (4) are identical, due to the fact that in this module all indicator series have a lead of four quarters, so that there are no missing end-points in real time.

Table 6: Sectoral out-of-sample forecasting accuracy, 2003q1–2006q2

	r	MAE	MAE/ SD	RMSE	RMSE/ SD	Theil's U
			Financial sector without FISIM			
Ex post	0.79	12.5	0.60	15.6	0.74	0.60
Quasi-real time	0.81	10.5	0.50	13.8	0.66	0.52
Real time (3)	0.61	16.6	0.79	19.3	0.92	0.74
Real time (4)	0.67	14.5	0.69	19.5	0.93	0.75
			Construction			
Ex post	0.01	2.05	0.96	2.43	1.13	0.93
Quasi-real time	–0.06	2.23	1.04	2.62	1.22	1.00
Real time (3) and (4)	0.00	2.28	1.06	2.54	1.18	0.97
			Core-GDP			
Ex post	0.91	0.49	0.40	0.64	0.52	0.38
Quasi-real time	0.90	0.50	0.41	0.65	0.53	0.39
Real time (3)	0.85	0.55	0.45	0.71	0.58	0.42
Real time (4)	0.87	0.50	0.41	0.66	0.54	0.40

Finally, let us try to identify how exactly the tentative decomposition of GDP into the three sectors contributes to improve the out-of-sample forecasting performance. To this end, recall that the out-of-sample forecasting accuracy measured by the correlation coefficient is 0.74 and 0.77 for the alternative real time specifications of the uni-sectoral indicator compared to 0.78 and 0.81 for the multi-sectoral instrument. Now, within the latter, the core-GDP module scores 0.85 and 0.87 in the two real time simulations, and the financial sector module 0.61 and 0.67.[47] Accordingly, out of sample, the core-GDP module forecasts its reference series better than the combined sectors forecast GDP growth, whereas the financial sector forecast is somewhat worse than the GDP forecast.

Obviously, the improvement of the forecasting accuracy in the core-GDP module that is due to the elimination of the volatility brought about by the financial sector, and possibly, the construction sector, more than outweighed the fact that the forecasting accuracy in the financial sector module is somewhat less than that of the uni-sectoral model, as well as the failure of the construction sector module to deliver any informative out-of-sample forecast at all.

[47] Interestingly, the out-of-sample forecasting accuracy in the financial sector module in quasi-real time is better than ex post. Now, recall that the measurement model for this module consists of two principle components, one extracted from long time series of monetary and financial indicators, the other one from rather short series taken from the KOF banking survey launched in 2000. Accordingly, the additional out-of-sample data points have a comparatively high potential to change the loadings of the shorter principle components, which is obviously what has happened. The resulting end-point instability, however, helped to improve the quasi-real time forecasts, which my come close to what we called a "learning model" (see note 42). Yet, with only 14 data points we are reluctant to push the interpretation too far and leave the assessment of an indicator model based on "learning principle components" for another study.

Now, keeping in mind that that core-GDP module, though by construction a residual, accounts for about 90% of GDP, it might well be that the most important improvement brought about by the multi-sectoral design was to purge the overall reference series from volatility stemming from the financial and/or construction sector, which helped to construct a better measurement model for the 90% of GDP represented by the core-GDP module. This would be the case if it turned out that the other modular forecasts do not contribute to improve the overall forecasting performance of the multi-sectoral indicator. This is a testable hypothesis.

For a first impression, let us check if the out-of-sample forecasts of the GDP growth rate suffer when we refer to the core-GDP module only rather than to the multi-sectoral indicator. Based on the correlation between indicator and GDP growth, this is indeed the case. The correlation coefficients based on the multi-sectoral indicator (see table 5), which are 0.87 ex post, 0.86 in quasi-real time as well as 0.78 and 0.81 for the two real time simulations, drop to 0.68, 0.67, 0.60 and 0.65, respectively. Which of the two omitted modules is responsible for the deterioration? To answer this question, we run a number of E-tests that reveal whether there is a significant change in forecasting performance when we add either the construction sector module or the financial module sector to a one-sectoral indictor consisting of the core-GDP module, or to two-sectoral indicators comprising the complementary modules. The results of these tests are given in table 7.

Table 7: E-tests comparing GDP forecasts, 2003q1–2006q2

	Core-GDP	Core-GDP + construction	Core-GDP + financial sector	Construction sector	Financial sector
Ex post (1)	2.68			0.71*	
	3.36				5.52
		3.48			5.56
			5.19	0.49*	
Quasi-real time (2)	2.37			0.77*	
	4.44				4.93
		4.29		0.40*	
			4.54		4.94
Real time (3)	1.26*				5.51
	1.84			0.89*	
		1.38*			5.51
			3.22	0.63*	
Real time (4)	5.58				3.89
	2.13			0.72*	
		5.62			3.85
			3.36	0.31*	

T-statistics, * signifies that an E-test fails to meet the 10%-significance level

As the table shows, the E-tests confirm that the out-of-sample forecasts that are delivered by the construction sector module are at that stage virtually useless, the t-statistics never even come close to meeting a moderate 10%-significance level. The financial sector module NOGA 65 without FISIM, however, adds significantly to the forecasting performance, and that holds ex post as in real time. It also makes no difference whether we look at the core-GDP module or at the combination of the latter with the construction sector module, both are inefficient without the forecast from the financial sector module. Given that the financial sector module represents only about 2% of Swiss GDP, this is a noteworthy finding.

7 Conclusion

Can a multi-sectoral design improve indicator-based forecasts of the GDP growth rate? The evidence from Switzerland presented here suggests that yes. In particular, we develop a composite business cycle indicator than combines 22 leading indicators within a multi-sectoral design, disaggregating Swiss GDP into the financial sector, the construction sector and a residual sector, referred to as core-GDP. We obtain a close fit to the reference series, the year-on-year growth rate of the Swiss GDP in quarterly frequency with a lead of two quarters, not only for the in-sample period from 1991q1 to 2002q4, but also for the 14 subsequent quarters that constitute the out-of-sample domain. Both amplitude and phase are predicted well, and notably better than with to alternative instruments, the traditional KOF barometer and a uni-sectoral indicator that draws on the same 22 indicator as the new multi-sectoral instrument.

The improvement of forecasting accuracy compared to the traditional barometer is not only due to the larger number of indicators, but also to the structure that is imposed by the multi-sectoral design. Yet, based on the evidence from the 14 available out-of-sample data points, it appears that at this stage only two of the three sectoral modules, the core-GDP module and the module financial sector without FISIM, contribute to the improved accuracy of forecasts; the out-of-sample forecast of the construction sector module does not outperform a random walk forecast. Hence, while in detail there is obviously scope for improvement regarding this particular composite indicator for Swiss GDP growth,[48] the empirical evidence presented here suggests that the multi-sectoral design is a promising approach for indicator-based forecasts if a target series can be assumed to represent a multi-dimensional process.

An important general conclusion suggested by these findings is that indicator-based forecasts, which are referring to a relatively large number of economic time series,[49] might yield superior results when some structure based on prior economic knowledge is imposed on the indicator set, disaggregating it into subsets, before trying to extract a common signal.

[48] In May 2006, the traditional KOF barometer was replaced by a multi-sectoral barometer that is designed along the lines presented here, though with a number of details modified (see KOF 2006). The out-of sample data that will get available with the passing of time will allow analyses similar to these in a couple of years.

[49] There number of papers that pool large numbers of more or less related economic time series into composite indicators without imposing a particular economic structure is a large and growing; see among others, STOCK AND WATSON (1999), ARTIS ET AL. (2001), FORNI ET AL. (2001), BANERJEE ET AL. (2003), GAYER AND GENET (2005), KHOLODILIN AND SILIVERSTOVS (2006) and TROY ET AL. (2007).

Appendix: Indicator series, sources and transformations

Module	Measurement model (data sources)	Original series	Aggregation into quarterly frequency	Transformation	Seasonal filter	Lead in quarters
Financial sector without FISIM	Short series (KOF survey)	Gross profit compared to the previous quarter	none	none	yes	2
		Demand for banking services from foreign customers compared to previous quarter	none	none	yes	1
		Revenue from commissions compared to previous quarter	none	none	yes	1
		Volume of private assets compared to previous quarter	none	none	yes	1
	Long series	M2	q = m2	$X_t - X_{t-4}$	yes	2
		Volume of outstanding credit	q = m2	none	yes	7
		SPI share market index	q = m2	$X_t - X_{t-4}$	no	1
Construction sector (KOF survey)		Expected employment	none		no	4
		Construction activity compared to the previous year	none		no	4
		Order backlog in the planning sector in months	none		no	4
Core-GDP	Measurement model manufacturing (KOF survey)	Expected incoming orders	q = m1	none	yes	2
		Expected production	q = m3	none	yes	2
		Expected purchases of intermediate goods	q = m3	none	yes	2
	Measurement model consumption (KOF survey, Seco Survey, Swiss Customs Office)	Hotels/restaurants revenue compared to previous year	none	$X_t - X_{t-4}$	no	3
		Hotels/restaurants: change of the assessment regarding level of employment compared to previous year	none	$X_t - X_{t-4}$	no	2
		Expectation regarding future economic situation	none	none	no	1
		Assessment of economic situation as favourable for larger purchases	none	$X_t - X_{t-4}$	no	3
		Change of expected sales in retail trade non-food compared to previous year	q = m2	$X_t - X_{t-4}$	no	2
		Passenger car import value	q = m1		no	1
	Measurement model exports (weighted European survey data)	Europe: expected production	q = m3	none	yes	2
		Europe: expected incoming orders	none	none	yes	2
		Order backlog in Germany	q = m3	$X_t - X_{t-4}$	yes	2

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（四） Assessing the Forecast Properties of the CESifo World Economic Climate Indicator: Evidence for the Euro Area

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Abstract

This paper evaluates short-term forecasts of real GDP in the Euro area derived from the CESifo Economic Climate indicator (WES) in terms of forecast accuracy. We compare the forecast properties of the WES with those of monthly composite indicators. Considering the WES is interesting because (i) it is exclusively based on the assessment of economic experts about the current economic situation, and (ii) it is timely released within the quarter on a quarterly basis. The empirical analysis is carried out under full information, which means that the competing monthly indicators are known for the entire quarter, and under incomplete information. Our findings exhibit that the forecast power of the WES is comparatively proper.

JEL Code: C22, C53.
Keywords: CESifo World Economic Survey, business-cycle forecasts, bridge models, out-of-sample forecast evaluation.

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1 Introduction

Obtaining short–term projections of real GDP from business–cycle indicators guarantees that timely information is explicitly exploited. These indicators include quantitative indicators, such as industrial production, confidence surveys and composite indicators. The forecast properties of business–cycle indicators have been examined by Parigi and Schlitzer (1995), Camba–Mendez et al. (2001), Baffigi, Golinelli, and Parigi (2002), Banerjee, Marcellino, and Masten (2003), Mourougane and Roma (2003), Rünstler and Sédillot (2003), Sédillot and Pain (2003), Gayer (2005) and Golinelli and Parigi (2007) for a number of OECD countries, which has shown that short–term forecasts of real GDP growth derived from such indicators usually perform properly.

Since Eurostat publishes the first official release of quarterly real GDP in the Euro area with a delay of several weeks, timely information about the state of the economy is appreciable. In addition to the quantitative indicators, certain composite indicators provide an insight. These include the economic sentiment indicator (ESI) of the European Commission, the OECD composite leading indicator (OLI) and the EuroCOIN indicator (ECI) by the CEPR that are calculated on a monthly basis by extracting the information contained in different quantitative indicators, confidence surveys, price indices and financial variables. Additionally, the CESifo Economic Climate indicator (WES) for the Euro area provides an assessment of economic experts about the current economic situation and their expectations.

This paper evaluates short–term forecasts of real GDP in the Euro area derived from the WES in terms of forecast accuracy. We compare the forecast properties of the WES with those of the ESI, OLI and the ECI. Focusing on the WES is interesting as it contains two specific features that are in contrast to the composite indicators: (i) it is exclusively based on the judgment of economic experts, and (ii) it is timely released within the quarter on a quarterly basis. A continuous monthly update of fresh monthly information within the survey quarter thus becomes impossible. A priori this suggests that the forecast accuracy of the WES is comparatively minor.[1]

We derive quarterly projections of real GDP from the competing indicators by estimating bridge models on the basis of a recursive regression procedure, which allows us to conduct a series of pseudo one–quarter–ahead out–of–sample forecasts. We explore the forecast properties of the indicators by means of standard forecast performance tests, which include the Root Mean Squared Forecast Error, the forecast accuracy test by Harvey, Leybourne, and Newbold (1997) – that is a

[1] Although, a number of studies for the Euro area have explored the forecast properties of a variety of business–cycle indicators, the WES has not yet been considered.

modified version of the Diebold and Mariano (1995) test – and a turning point test developed by Pesaran and Timmermann (1992) that allows us to judge forecast directional correctness. We select an AR–model for real GDP growth to obtain the benchmark projection.

As in Golinelli and Parigi (2007) and Rünstler and Sédillot (2003) our comparison of the forecast performance of the indicators is twofold. In the first step, we generate pseudo out–of–sample forecasts of real GDP growth under the assumption of full information, which means that the indicators are known for the entire three months within the current quarter. In the second step, we derive pseudo out–of–sample forecasts of real GDP growth by focusing on incomplete information, which implies that the monthly indicators – i.e. the ESI, OLI and the ECI – are only partially available within the current quarter. As a consequence, these indicators have to be extrapolated to generate the missing observations for the quarterly value, which exposes additional uncertainty.

Our findings suggest that the WES is an accurate forecast measure that is capable to provide a sound understanding of the actual economic situation at a relatively early moment in the quarter. The forecast properties of the WES are similar to those of the OLI, which constitutes the dominant composite indicator in terms of forecast accuracy. A comparison between the forecasts performance of the WES and Consensus Forecast on the basis of real time data provides robustness of the results by showing that the rival predictions perform equally proper.

The remainder of the paper is organized as follows. Section 2 sets out an overview of bridge models, introduces our data set for the Euro area and briefly discusses the forecast performance tests applied. In Section 3, the forecast evaluation is presented. First, we assess out–of–sample forecasts of real GDP derived from the candidate indicators (i) for the case of full information and (ii) for the case of incomplete information. The forecasts are evaluated by means of the forecast performance tests. Second, we compare the forecast properties of the WES and Consensus Forecast by using real time data. Section 4 provides concluding remarks.

2 Modeling Approach, Choice of Data and Forecast Performance Tests

2.1 Quarterly Bridge Models

Usually, bridge models are based on an Autoregressive Distributed Lag model of the form (Banerjee, Marcellino, and Masten (2003)):

$$A(L)Y_t = \delta + \sum_{j=0}^{n} B_j(L)X_{jt} + \varepsilon_t, \tag{1}$$

where Y_t denotes real GDP expressed in quarterly growth rates, δ is a constant term, X_{jt} are the quarterly values of the business–cycle indicators, $A(L)$ and $B_j(L)$ describe lag polynomials and ε_t are residuals that are assumed to be white noise. Quarterly predictions of real GDP growth are derived by exploiting the timely information contained in the indicators.

The application of bridge models to generate short–term forecasts of real GDP can be carried out either under the assumption that the indicators are completely available for the current quarter or under the assumption that the indicators are only partially known, which means that information is only disposable for the first months of the quarter. This requires the indicators to be extrapolated to obtain the missing monthly observations for the entire quarter. Three different situations can be distinguished (Golinelli and Parigi, 2007):

1. Quarterly forecasts of real GDP with indicators that are completely unknown. In this case the indicators have to be extrapolated three months into the future to derive the quarterly values.

2. Quarterly forecasts of real GDP derived from indicators that are known for the first month of the current quarter, which means that the monthly series need to be extrapolated for two months.

3. Quarterly forecasts of real GDP derived from indicators that are known for the first two months of the current quarter, which implies that the monthly series need to be extrapolated only for one month.

In the run–up of the forecast exercise the extrapolated values of the monthly series have to be aggregated to obtain the quarterly value. The aggregation scheme can be based on the mean value of the monthly data.

Obviously, obtaining quarterly projections of real GDP from indicators that are released on a monthly basis is exposed to additional uncertainty, which stems

from the necessity of extrapolating the monthly series under incomplete information. Using indicators that are published on a quarterly basis possibly avoids this ambiguity, but at the expense of less up–to–date information since a continuous monthly update becomes impossible.

2.2 Data Selection

Our data set for the Euro area comprises real GDP and various business–cycle indicators for the sample period from 1991Q1 to 2006Q3. Real GDP is seasonally adjusted and transformed into quarterly growth rates. The business–cycle indicators are grouped into quantitative and qualitative indicators:

1. The set of quantitative indicators includes industrial production (IP), new car registrations (CAR) and industrial production in construction (IPC), which are collected from Eurostat, and additionally retail sales (RS), which is taken from the OECD.[2] The data is seasonally adjusted and transformed into quarterly growth rates.

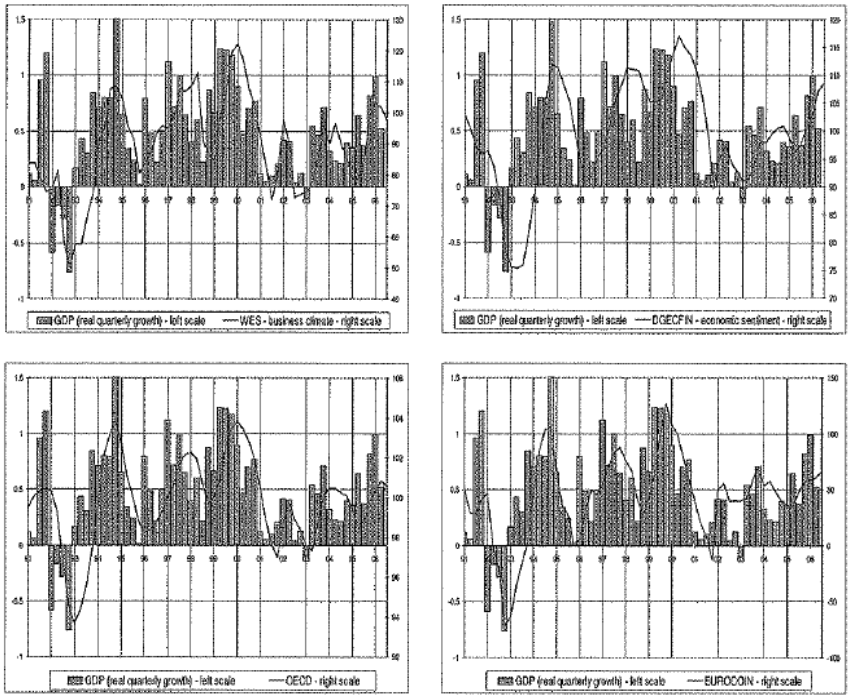
2. The qualitative indicators comprise the CESifo Economic Climate indicator (WES) for the Euro Area and three composite indicators, namely the economic sentiment indicator (ESI) of the European Commission, the OECD composite leading indicator (OLI) and the EuroCOIN indicator (ECI) of the CEPR, which are widely acknowledged and readily available. As the qualitative indicators are constructed to fluctuate around a constant mean and thus are considered to be mean stationary, their level values are implemented. Figure 1 depicts quarterly real GDP growth in conjunction with the qualitative indicators.

The WES summarizes the assessments of economic experts on the economic situation and outlook. It is exclusively based on qualitative information and is timely published on a quarterly basis within the survey quarter.[3] The ESI combines the weighted information contained in several confidence indicators, such as industrial, service and consumer surveys (European Commission, 2007). The OLI is derived from an aggregation of a number of national indicators, which include survey data, several quantitative indicators, price indices, financial variables and

[2]Since Eurostat provides information on retail sales not before 1995, we decided to include OECD data.

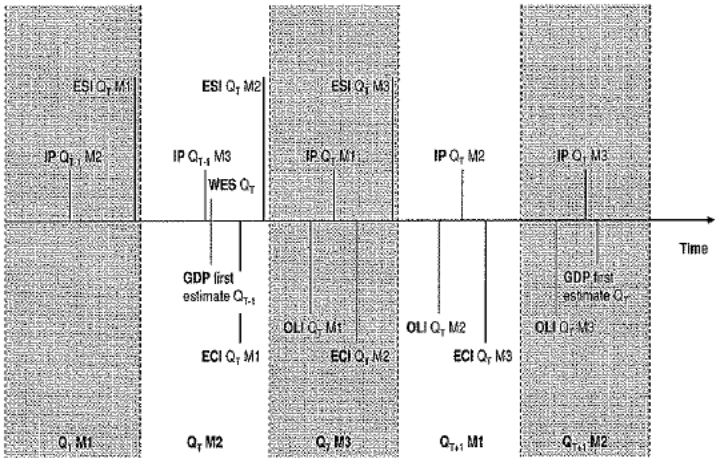
[3]The WES is calculated as the arithmetic mean of the assessment of the economic situation in the current quarter and the expectations about the economic situation in the coming two quarters. The indicator reflects the responses of about 275 experts. See Stangl (2007) for an overview.

Figure 1: Qualitative Indicators and Quarterly Real GDP Growth



the terms of trade (OECD, 2003). Finally, the ECI is constructed from a dynamic factor analysis of an intensive number of business–cycle indicators with the purpose to track the principal common factor of aggregate economic activity (Altissima, et al., 2001). While the WES is released on a quarterly basis, the composite indicators are published monthly.

Figure 2: Stylized Overview of Relevant Events



Notes: IP: industrial production; ESI: economic sentiment indicator; WES: CESifo Economic Climate indicator for the Euro area; ECI: EuroCOIN indicator; OLI: OECD leading composite indicator. Q_T denotes the current quarter; Mx denotes the respective months of the quarter ($x = 1, 2, 3$).

For the production of short–term forecasts of real GDP in real time, Figure 2 presents a stylized overview of relevant events. The first release of real GDP growth for the current quarter Q_T is published in the middle of the second month M2 of the next quarter Q_{T+1}. Usually, the set of indicators is completely available by then. IP is released with a delay of about six weeks, which implies that industrial production for Q_TM1 – as an example – is issued in Q_TM3. The WES is issued in the middle of the second month M2 of the current quarter Q_T, while the ESI is published at the end of each month, which means that the indicator for the current quarter Q_T is completely available at the end of Q_TM3. The ECI exhibits a post–carriage of two to three weeks. The OLI is released with a delay of about six weeks, which implies that the indicator for the current quarter Q_T

is completely available not until the second month M2 of the next quarter Q_{T+1}. For the creation of forecasts this timing of events has to be taken into account.

2.3 Forecast accuracy tests

We evaluate the forecast properties of the candidate indicators by means of a number of forecast performance tests that refer to forecast accuracy and forecast direction correctness. The out–of–sample Root Mean Squared Error (RMSE) is employed as a descriptive measure, which provides an indication of the accuracy of a forecast by stating that projections with a lower value are preferable. In addition, we apply the test of Harvey, Leybourne, and Newbold (HLN) (1997) that evaluates the differences of forecast errors derived from point forecasts of competing models for statistical significance.

The HNL (1997) test is a modified version of the test developed by Diebold and Mariano (1995) that is corrected for a small sample bias. The null hypothesis of equality of the expected forecast performance of two competing models is formulated as:

$$H_0 : E\left[\delta_t\right] = 0, \tag{2}$$

where the sequence of loss differentials δ_t is defined by: $\delta_t = g(e_{it}) - g(e_{jt})$. The loss functions $g(e_{it})$ and $g(e_{jt})$ are derived from the forecast errors e_{it} and e_{jt} of the rival models. Although the test allows for a wide class of prediction accuracy measures, we restrict the analysis to the out–of–sample forecast RMSE to specify the loss functions. The test is based on the following statistic:

$$\text{HLN} = \text{DM}\left[\frac{N + 1 - 2h + h(h-1)/N}{N}\right]^{\frac{1}{2}}, \tag{3}$$

where DM denotes the standard statistic of the Diebold and Mariano (1995) test, N is the number of independent point forecasts and h denotes the forecast horizon. The test compares the HLN statistic to a critical value that is drawn from a Student's t–distribution with $N - 1$ degrees of freedom.

Finally, we employ the turning point (TP) test proposed by Pesaran and Timmermann (1992) to evaluate forecast directional accuracy since obtaining information on the expected direction of movements in real GDP growth is also valuable. The TP test is a distribution–free procedure that is based on the proportion of times that the direction of change in the target variable y_t is correctly predicted by the time series of forecasted values x_t in any underlying sample. It involves a comparison to a naive coin flip as the benchmark model and only requires information on the direction of change of the target time series and the time series of forecasted values. The test is based on the standardized binomial

variate, which is asymptotically distributed as $N(0,1)$. The procedure is valuable for a wide class of underlying probability distributions, as it only postulates that the probability of changes in the direction of y_t and x_t is time–invariant. We implement the test by focusing on the quarter on quarter direction of change in real GDP growth.

3 Out–Of–Sample Forecast Evaluation

We generate quarterly forecasts of real GDP from the candidate indicators by estimating the bridge models (1) recursively over the forecast sample from 2001Q1 to 2006Q3. The forecasts are derived as one–quarter–ahead out–of–sample predictions for each quarter following the starting sample from 1991Q1 to 2000Q4, that is stepwise augmented by including an additional quarter.[4] We evaluate the forecast properties of the indicators by means of the forecast performance tests, which are based on the forecast errors of 23 out–of–sample predictions. We select an AR(1)–process for real GDP growth to obtain the benchmark projection.[5]

As in Golinelli and Parigi (2007) and Rünstler and Sédillot (2003), our evaluation of the forecast performance of the indicators is two–fold. First, we explore pseudo out–of–sample forecasts of real GDP growth by focusing on full information, which implies that all indicators are known for the entire quarter. Second, we examine pseudo out–of–sample forecasts of real GDP growth by considering the moment of the release of the WES in the quarter, which means that the monthly indicators are only partially available. Since the monthly indicators need to be extrapolated, we investigate the use of various auxiliary forecast models that include a naive projection,[6] an univariate autoregressive moving average (ARMA) model, a vector autoregressive (VAR) model and a Bayesian VAR (BVAR) model, all of which are adequate to account for the staggered timing of the monthly data releases.

Our forecast exercise is based on a variety of bridge models for the candidate indicators that vary in the choice of the lag length. Following Granger (1993), we chose those specifications that provide the lowest value of the out–of–sample forecast RMSE under complete information as a criterion of model selection,

[4]The bridge models for each candidate indicator are estimated by including an impulse dummy. The dummy variable accounts for an outlier in quarterly real GDP growth and takes the value of one in 1995Q1 and otherwise zero.

[5]The inspection of the correlogram of quarterly real GDP growth strongly suggests the specification of an AR(1)–process. In addition, we find that the AR(1)–model unambiguously dominates competing ARIMA models in terms of the out–of–sample forecast RMSE.

[6]In the naive projection approach, the missing monthly observations are derived by means of a random walk forecast, i.e. the values depend only on the last known monthly data point.

since in–sample selection measures – such as the standard information criteria – frequently fail to provide strong implications for the out–of–sample performance.

3.1 Predictions of real GDP under Full Information

3.1.1 Indicators taken singly

Our comparison of the forecast properties of the candidate indicators starts by focusing on the case of full information. For each indicator, Table 1 displays the outcome of the forecast performance tests, which are based on the one–quarter–ahead out–of–sample forecast errors.

Table 1: Forecast Properties of the Indicators taken singly

		RMSE	HLN–Test	TP–Test	p–value
Quantitative indicators					
Industrial production	IP	0.21	–1.37	12	0.34
Retail sales	RS	0.30	+1.50	14	0.11
Car registration	CAR	0.28	+1.06	14	0.11
Ind. prod. construction	IPC	0.28	+0.84	14	0.11
Qualitative indicators					
CESifo Economic Climate	WES	0.22	–1.52	15	0.05
OECD Leading indicator	OLI	0.20	–2.24	16	0.02
Economic sentiment	ESI	0.24	–0.61	15	0.05
EuroCOIN indicator	ECI	0.26	–0.08	13	0.20
Benchmark forecast					
AR(1) model	AR	0.26	–	13	0.20

Notes: For the HLN (1997) test the corresponding critical value is ±1.31 for the 5% level with 22 degrees of freedom. A value of the HLN statistic below -1.31 implies an improvement, while a value above +1.31 implies a worsening of the forecast compared to the AR(1) benchmark prediction. TP denotes the number of correctly identified changes in the direction of real GDP growth; the p–value denotes statistical significance.

Industrial production constitutes the sole quantitative indicator that – as indicated by the HLN (1997) test – outperforms the AR(1) benchmark forecast significantly. The same applies to the WES, which equally fulfills forecast accuracy but also represents a proper measure for correctly predicting turning points. The OLI surpasses the competing composite indicators by improving upon the AR(1) benchmark prediction unambiguously. Likewise the OLI is appropriate - similar to the ESI - for accomplishing forecast directional correctness.

The forecast performance of the ECI is comparatively poor. This finding is sharply in contrast with the results of Rünstler and Sédillot (2003), who conclude that the EuroCOIN indicator constitutes the best composite indicator in terms of forecast accuracy by focusing on the forecast sample from 1998Q1 to 2001Q4. Accordingly, this suggests that the forecast power of an indicator can vary considerably over time (see also Baffigi, Gionelli and Parigi, 2004).

3.1.2 Encompassing regressions

Short–term forecasts of real GDP derived from IP under complete information are possibly enhanced by additionally accounting for the qualitative indicators.[7] We explore this conjecture by running a test of forecasting encompassing, which compares the accuracy of two rival forecasts.

Following Clements and Harvey (2006), the test is based on the regression equation:

$$y_t = \alpha f_{1t} + (1 - \alpha) f_{2t} + u_t,$$

where y_t denotes the reference series that is forecasted through a linear combination of the rival forecasts f_{1t} and f_{2t} with a combined forecast error u_t. The null hypothesis that f_{1t} is encompassed by f_{2t} is: $H_0 : \alpha = 0$, which implies that f_{2t} contains all the useful information in f_{1t}. The alternative hypothesis is typically one–sided, i.e. $\alpha > 0$. Table 2 summarizes the outcome.

Table 2: Encompassing regression against IP

		Estimated α	Std. Dev.
CESifo Economic Climate	WES	0.43	0.19
OECD Leading indicator	OLI	0.57	0.23
Economic sentiment	ESI	0.25	0.28
EuroCOIN indicator	ECI	-0.04	0.31

Notes: Test of forecasting encompassing of two rival forecasts. The null hypothesis that the forecast of a qualitative indicator is encompassed by the forecast of industrial production is rejected when α is significantly larger than zero.

The findings show that forecasts of real GDP growth generated by IP benefit form the additional information contained in the WES since the null hypothesis of forecast encompassing is clearly rejected. The same holds for the OLI, while for the ESI and the ECI the estimated parameter α is not significantly different

[7] Since the forecast properties of RS, CAR and IPC are relatively poor, we ignore the use of these indicators in the following.

from zero. This supports the notion that the WES and the OLI constitute the superior qualitative indicators as measured in terms of forecast accuracy.

3.1.3 Combined forecast models

Deriving forecasts of real GDP from industrial production combined with an individual qualitative indicator might give a deeper insight into the predictive power of the rival series.[8] Table 3 summarizes the results of different forecast performance tests. The HLN (1997) test compares the combined IP forecasts with the pure IP forecasts by evaluating the differences of the forecast errors for statistical significance.

Table 3: Combined Forecast Models

	RMSE Ratio	HLN–Test
IP + CESifo Economic Climate	0.95	–0.35
IP + OECD Leading indicator	0.95	–0.89
IP + Economic sentiment	1.01	–0.27
IP + EuroCOIN indicator	1.14	+1.06

Notes: RMSE of the combined IP forecast in ration to the benchmark RMSE of the pure IP forecast. For the HLN (1997) test the corresponding critical value is ±1.31 for the 5% level with 22 degrees of freedom. A value of the HLN statistic below -1.31 implies an improvement, while a value greater that 1.31 implies a worsening of the forecast compared to the benchmark prediction.

Short-term forecasts of real GDP generated by IP combined with the WES lead to an improvement of the out–of–sample forecast RMSE that declines slightly. This also applies to the OLI, but not to the ESI and the ECI, which confirms our results of the encompassing regressions. However, the HNL (1997) test indicates that the forecasts from the combined IP models are not unambiguously superior. Since this suggests that the gains of combined models are only minor, we continue to focus on the indicators taken singly.

So far, our evaluation of the forecast performance of the indicators has built on the assumption of full information, which establishes the most convenient environment for the monthly indicators in the sense that their forecast power ought to decline when less information is available. Next, we turn to an assessment of this issue.

[8]This leads to various model specifications that differ in the lag structure. Again as a criterium for model selection, we chose those specifications that produce the lowest out–of–sample forecast RMSE.

3.2 Forecasting real GDP under Incomplete Information

Obtaining a first prompt forecast of real GDP from the candidate indicators at an early moment in the quarter contributes to a sound understanding of the actual economic situation. As we aim at evaluating the forecast performance of the WES, we consider the moment of the release of that indicator, which usually takes place – as shown in Figure 2 – in the middle of the second month of the quarter. As a consequence, the monthly indicators have to be extrapolated since they are almost completely unknown. Only the ESI is available for the first month of the quarter.

The necessity of forecasting the monthly indicators exposes additional uncertainty. Since the forecast performance of the monthly indicators crucially depends on the quality of the monthly predictions, we investigate the application of several auxiliary forecast models that are capable of accounting for the delayed releases of the monthly series.

Our forecast exercise under incomplete information proceeds in two steps. First, we derive forecasts of the monthly indicators from the different auxiliary forecast models. Second, we investigate the forecast performance of the indicators at the moment of the release of the WES by using the extrapolated monthly series.

3.2.1 Predicting the monthly indicators

We generate forecasts of the monthly indicators by using several auxiliary forecast models that include a naive projection, univariate ARMA models, VAR models and BVAR models.[9] Rünstler and Sédillot (2003) find that BVAR models perform well in terms of the out–of–sample forecast RMSE, closely followed by VAR models and ARMA models that also establish a firm ground as regards forecast accuracy.[10] Diron (2006) states that especially ARMA models constitute a convenient forecast device in terms of forecast exactness.

The predictions of the monthly indicators derived from the auxiliary forecast models embrace three–month–ahead forecasts for IP, the OLI and the ECI, while for the ESI two–month–ahead forecasts are established. The forecast models are specified with varying lag lengths. The VAR models include all candidate indicators to make efficient use of the entire information available.[11] The BVAR models are set up with the standard Minesota priors – as proposed by Doan,

[9] We use an ARIMA model for IP and ARMA models for the monthly composite indicators.

[10] Rünstler and Sédillot (2003) find that BVAR models outperform the competing auxiliary forecast models especially for longer forecast horizons of up to six months.

[11] In addition, we have considered various other business–cycle indicators, such as confidence surveys, financial variables and the terms of trade which, however, have not lead to an improvement of the forecasts.

Litterman, and Sims (1984) – which impose restrictions by assuming that the endogenous variables follow a random walk. As a criterium of model selection we chose those specifications that produce the lowest value of the out–of–sample forecast RMSE.

We forecast the monthly indicators by estimating the auxiliary forecast models recursively over the forecast sample from January 2001 to September 2006. The forecasts of the monthly indicators are derived as out–of–sample predictions for the respective months of each quarter following the starting sample from January 1991 to December 2000 that is continuously expanded by adding the next months of the subsequent quarter. We evaluate the forecasts of the monthly indicators by focusing on the out–of–sample forecast RMSE that results from the aggregate quarterly values of the forecasted monthly series.[12] Table 4 displays the outcome. For each indicator, the best auxiliary forecast model is marked by an asterisk.

Table 4: Performance of quarterly indicator forecasts

	Naive Projection	ARMA	VAR	BVAR
Industrial production[a]	1.00	1.06	0.97	0.96*
OECD indicator[a]	1.00	0.69*	0.82	0.81
Economic sentiment[b]	1.00	0.85*	0.96	0.92
EuroCOIN indicator[a]	1.00	0.93*	1.01	0.99

Notes: Measured in terms of the out–of–sample forecast RMSE relative to the naive projection. Industrial production in monthly growth rates, all other indicators in levels. The best auxiliary forecast model evaluated in terms of the lowest out–of–sample forecast RMSE is indicated by an asterisk. [a]Three step ahead forecasts. [b]Two step ahead forecasts.

Forecasts of industrial production resulting from the BVAR model predominate in terms of the out–of–sample forecast RMSE. This is in line with Rünstler and Sédillot (2003), who report a similar finding. For the composite indicators the specified ARMA models provide the lowest out–of–sample forecast RMSE, which implies that these models are preferable. Not surprisingly the naive projections come off badly. Building on these results, we derive the missing monthly values of the candidate indicators for each quarter in the forecast sample on the basis of the best auxiliary forecast models.

[12]The aggregate quarterly values of the indicators are calculated as the mean of the forecasted monthly series.

3.2.2 Real GDP forecasts with predicted monthly indicators

We generate quarterly forecasts of real GDP from the candidate indicators by readopting the recursive estimation procedure over the forecast sample from 2001Q1 to 2006Q3.[13] We implement the predictions of the monthly indicators that follow from the best auxiliary forecast models to construct the required quarterly values. For each indicator, Table 5 summarizes the results of the forecast performance tests, which are based on the one–quarter–ahead out–of–sample forecast errors.

Table 5: Forecast Properties at the Date of the WES Release

		RMSE	HLN–Test	TP–Test	p–value
Quantitative indicator					
Industrial production	IP	0.28	+0.41	14	0.11
Qualitative indicators					
CESifo Economic Climate	WES	0.22	–1.52	15	0.05
OECD indicator	OLI	0.22	–1.48	15	0.05
Economic sentiment	ESI	0.27	+0.27	15	0.05
EuroCOIN indicator	ECI	0.28	+0.76	12	0.34
Benchmark forecast					
AR(1) model	AR	0.26	–	13	0.20

Notes: For the HLN (1997) test the corresponding critical value is ±1.31 for the 5% level with 22 degrees of freedom. A value of the HLN statistic below -1.31 implies an improvement, while a value above +1.31 implies a worsening of the forecast compared to the AR(1) benchmark prediction. TP denotes the number of correctly identified changes in the direction of real GDP growth; the p–value denotes statistical significance.

The forecast properties of the OLI clearly dominate those of the competing monthly indicators in terms of forecast accuracy. Only projections derived from the OLI outperform – as illustrated by the HLN (1997) test – the AR(1) benchmark forecast. In contrast the forecast performance of IP, the ESI and the ECI deteriorates considerably. In addition to the OLI, the ESI maintains the capacity of correctly predicting turning points.

For a comparison of the forecast properties of the WES with those of the competing monthly indicators, we employ the HLN (1997) test to evaluate the differences of the forecast errors for statistical significance. The results are shown

[13]Notice that the bridge models for the candidate indicators retain to those specifications that have been selected under full information.

in Table 6, which indicate that the WES surpasses industrial production, the ESI and the ECI unambiguously, while the OLI performs equally well.

Overall, the WES appears to constitute – in addition to the OLI – a comparable efficient forecast measure that is available at a relatively early moment in the quarter. Forecasts obtained from the WES dominate those derived from industrial production, the ESI and the ECI and improve upon the AR(1) benchmark forecast significantly. The poor performance of IP, the ESI and the ECI is – at least to some extent – attributed to the additional uncertainty arising from the necessity of extrapolating the missing monthly data.

Table 6: Forecast Comparison to the WES

	IP	OLI	ESI	ECI
HLN Statistic	+1.67	−0.05	+1.35	+1.49

Notes: HLN (1997) test of equal forecast performance of the WES and the competing monthly indicators. H_0 is rejected when the HLN statistic is above or below the critical value that amounts to ±1.31 for the 5% significance level with 22 degrees of freedom.

The forecast performance of the OLI is comparatively strong since in contrast to the competing monthly indicators it does not deteriorate under incomplete information. Apparently for short–term forecasts of real GDP growth the OECD indicator seems to be an adequate measure, which can be relatively accurately extrapolated. Indeed, we find that an AR(2) process for the OLI captures the underlying time series properties in the sample period from 1991Q1 to 2006Q3 properly.

3.3 Real time evaluation of the forecast performance of the WES

Compared to competing monthly indicators and to univariate approaches the WES ensures a proper forecast performance concerning real GDP growth in the Euro area. However, this provides only limited comfort as one might be more interested in the forecast performance of a chosen model not only relative to an arbitrarily selected time series benchmark model but to forecasts of professional researchers and agencies. Yet, choosing the forecasts of a single agency is somehow again arbitrary and will reveal little in terms of the overall performance of the tested model, as they have different strengths and weaknesses over time and are thus difficult to rank. Due to diversification gains, combining a range of forecasts from professional agencies tends to outperform most individual predictions over

time and thus provides a fairly good benchmark for a chosen model.[14] In the following, we use the quarterly Consensus Forecasts for the Euro area published by Consensus Economics as point of reference. The Consensus Forecast is widely-used as a benchmark in the literature of out–of–sample forecasting and is well known as hard to beat. It is calculated as the arithmetic average of the individual predictions of the participating panelists. The quarterly Consensus Forecast for the Euro area is published only once a quarter, namely in the second week of the third month and is based on a survey in the previous two weeks.

Like many macroeconomic variables, real GDP growth is subject to data revisions as more accurate estimates become available. As the Consensus Forecast is built on an information set available at the time of publication, evaluating the predictions by means of today's revised real GDP time series and comparing their forecast abilities to those of the WES in this manner is somehow unequable and misleading. The use of real time data, i.e. vintage versions of data that were available on specific dates in history, for estimating and forecasting the chosen model specification and for calculating the forecast errors provides an adequate framework. The Euro Area Business Cycle Network (EABCN) provides vintage data of several macroeconomic variables for the Euro area in its EABCN Real Time Database (RTDB), based on series reported in the ECBs Monthly Bulletins.[15] To ensure comparability with the Consensus Forecasts as benchmark, we feed the specified bridge equation for the WES with vintage data of real GDP of the month of the WES release, which corresponds to the month when the first estimate of last quarter's GDP is published. We derive short-term forecasts of the current's quarter real GDP by adopting the described exercise of augmentation. The bridge model for the WES thereby retains the specification selected under full information.

Following Zarnowitz and Braun (1992) and Batchelor (2001) we use the values of real GDP available one year after the publication of the predictions as the relevant realizations for computing the forecast errors. Due to data limitations, our real time forecast horse race is restricted to 14 independent point forecasts.[16] As the quarterly Consensus Forecast for the Euro area is only updated in the last

[14] A large academic literature has studied the benefits of pooling forecasts from professional agencies. Batchelor and Dua (1995) showed that the Blue Chip Economic Indicators consensus forecasts for the US outperformed about 70–80 % of the panelists in the 1980s. Zarnowitz (1984) and McNees (1987) found similar results for a number of US macroeconomic variables as target.

[15] As the RTDB builds on the Euro area concept, the vintage data for real GDP comprises the EU12 and currently places quarterly time series on a monthly basis from January 2001 until December 2006 at the disposal.

[16] The quarterly Consensus Forecast for the Euro area is published only since the first quarter 2003. Following the procedure described above, we calculate forecast errors up to the predictions of the second quarter 2006.

month of the quarter, the comparison approach thus grants additional information of up to one month to the professional forecasters compared to the WES experts. This suggests that the forecast performance of the WES might be inferior. We evaluate the forecast properties of the WES and of the Consensus predictions by taking reference to the forecast accuracy tests. As the quarterly Consensus Forecasts for the Euro area are published as year-on-year growth rates, we convert the WES predictions to that unit in order to make both time series comparable. Table 7 summarizes the results of our real time forecast comparison.

Table 7: Real time evaluation of the forecast performance of the WES

	RMSE	HLN–Test
CESifo Economic Climate	0.32	0.77
Consensus Forecast	0.30	–

Notes: The HLN (1997) test is based on 14 independent point forecasts. The corresponding critical value for the 5% level is ±1.35 with 13 degrees of freedom. A value of the HLN statistic below -1.35 implies a significant improvement, while a value greater that +1.35 implies a significant worsening of the forecast compared to the Consensus Forecast benchmark prediction.

Although the Consensus Forecast benefits from additional information of up to one month within the predicted quarter, it shows only a slightly lower out–of–sample forecast RMSE, but fails to outperform the WES in terms of real time out–of–sample forecast accuracy. This supports the results that the WES constitutes an accurate indicator in terms of deriving flash estimates of real GDP growth at a relatively early stage within the current quarter.

4 Conclusion

We have evaluated short–term forecasts of real GDP in the Euro area derived from the CESifo Economic Climate indicator (WES) in terms of forecast accuracy. The forecast properties of the WES have been compared to those of the ESI, OLI and the ECI. Considering the CESifo indicator is interesting because it differs from the monthly composite indicators in two specific aspects: (i) it is exclusively based on the assessment of economic experts about the current economic situation, and (ii) it is released within the quarter on a quarterly basis. A continuous monthly update of fresh monthly information within the survey quarter thus becomes impossible.

Our evaluation of the forecast performance of the WES has concentrated on both, the case of full information, which means that the competing monthly indi-

cators are completely known for the quarter, and on the case of incomplete information. The forecast sample has run from 2001Q1 to 2006Q3. Several forecast performance tests have been implemented, including tests on forecast accuracy and forecast directional correctness. Our findings have shown that the forecast power of the WES is comparatively proper.

Short–term forecasts of real GDP derived from the WES have the potential to provide an adequate understanding of the economic situation at an early moment in the quarter. This applies also to the OLI that has turned out to be the dominant composite indicator in terms of forecast accuracy. Comparing the forecast performance of the WES and Consensus Forecast by means of real time data supports the findings by showing that the rival predictions are equally precise.

Since the WES for the Euro area is also published for several member states it seems interesting to evaluate the forecast performance of the national indicators, which possibly provide a comprehensive insight on the current area–wide economic situation. Furthermore, short–term forecasts of real GDP derived from aggregate indicators are possibly outperformed by the aggregation of individual country forecasts derived from national indicators. Marcellino, Stock, and Watson (2003) find support for this conjunction by showing that forecasts constructed from the aggregation of individual country forecasts seem to be more accurate. As a consequence, comparing the forecast performance of the WES for the aggregate Euro area and the member states might be fruitful. In future research, these points will be addressed.

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