Spanish NTA along time

Work in progress based on the following paper

Cyclically Neutral Generational Accounting

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Outline of the presentation

- The Generational Accounting technique
- A methodological improvement:
  - Isolating indicators from the cycle
  - Disentangling other effects: demographic, wealth and pure cycle effects
- An illustration to the Spanish case

GA in partial equilibrium

(Auerbach, Gokhale and Kotlikoff, 1991, 1992)

- Does the IBCG holds? If living and future generations pay enough

$$k = t - D, \ldots, \infty .$$

$$D_{t0} = \sum_{t=t0}^{\infty} S_t (1+r)^{t0-t} = \sum_{k=t-D}^{t} N_{t,k} + \sum_{k=t+1}^{\infty} N_{t,k}$$

- Estimating net payments of living generations (*N*) :
  1. From cross section data by age project longitudinal profiles up rating at "g"
  2. Assuming constant policy (future generations pay/receive the same)

  Being P population of this age (*j*), year (*t*)

$$S_t = \sum_{j=0}^{J} P_{jt} \tau_{jt} \qquad \tau_{\mathrm{jt}} = \tau_{\mathrm{jt}_0} (1+\mathrm{g})^{\mathrm{t}-\mathrm{t}_0}$$

- This τ is also NTA *TG*
- A positive (negative) residual is the implicit debt (wealth)
  - Expressed in absolute terms:
    - sustainability gap (SG)
    - As a share of (intertemporal) GDP (*k*)

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t \, (1+r)^{t_0-t} + SG_{t_0}$$

The need to Isolate GA (&NTA) indicators from the cycle

- GA basic claim: under changing population structure, short run deficit/wealth measures might not reflect at all the long situation of fiscal policy .
  - Long run forward looking techniques projecting future implicit debt.
- But, short run deficit/wealth measures mix cycle, policy and other effects.
  - Short run techniques that try to "clean" the cycle from deficit measures.
  - Common feature: Backward looking econometric analysis on correlations between government revenue/expenditure and economic activity.

- We combine both to obtain neutral GA. As a result, other effects arise
  - Incorporate in GA short run method by Girouard and André (2005), the basis for the standardized measure of the *cyclically adjusted budget balance* reported by the European Commission.
  - Basic idea: depart from a cyclically neutral budget balance. Other attempts Feist et al. (1999) application to Finland. discrete adjustments during the forecast that design a return to what is considered a cyclically neutral state
  - We establish a systematic process -within the GA framework- to disentangle cycle effect and other sources of mismeasurement of the pure policy effect –the demographic effect and the debt effect.
  - Relevant for international comparison

Obtaining a cyclically neutral budget balance

- Methods directed to disentangle cyclical from structural budget components
- Basic idea:
  - Economic activity (output gap) affects tax bases (wages, benefits, consumption, etc.).
    - 1st step: Identifying cycle (trend or potential GDP)
  - Those tax bases affect public revenue and expenditure.
    - 2nd step: Obtaining elasticities of budget aggregates to the cycle
- Methods differ in the approach taken in both steps:

Obtaining a cyclically neutral budget balance: 1st step

- 1st Step: Identifying the cycle (trend or potential GDP)
  - Directly extracted from observed output data using econometric smoothing devices like Hodrick-Prescott filters to obtain *trend* GDP
    - Advantages: transparent and mechanical, hence more comparable.
    - Problem: end point bias (underestimates the last observations)
  - Estimating *potential* output based on the production function approach (OCDE, EU moves from 1 to 2, still some countries use 1)
    - Advantage: Micro foundations
    - Problem: increasing the arbitrariness in the decisions of key variables like the structural unemployment rate, the rate of technological change, the way it affects to productive factors, etc
- EC method:
  - Estimates the potential output based on a Cobb-Douglas production function.
  - Inputs: Capital stock and Potential labor estimated combining data on:
    - the working age population;
    - a measure of trend total factor productivity and trend labor force obtained throw the HP filter
    - the NAIRU unemployment rate, derived form a Kalmar filter Phillips curve approach
- Once the output gap is identified, we move to 2nd step: elasticities

2nd step: Obtaining a cyclically neutral budget balance

- Elasticities of budget aggregates to economic activity (to the output gap). Girouard and André (2005) estimate separate elasticities for affected aggregates:
  - Revenues: Income tax (personal and corporate), Social contributions, Consumption taxes.
  - Expenditure: Unemployment.
  - EC uses global tax/exp, we use desegregated

$$\frac{T_{i,t}^{*}}{T_{i,t}} = \left[\frac{Y_{i,t}^{*}}{Y_{i,t}}\right]^{\varepsilon_{t_i y}}$$

$$\frac{G_{i,t}^{*}}{G_{i,t}} = \left[\frac{U_{i,t}^{*}}{U_{i,t}}\right]^{\varepsilon_{g,u}}$$

1+ 2 implies: a Cyclically Adjusted Budget Balance (CABB) in the base year of the GAc exercise

$$S_t^*$$

Decomposing changes in fiscal sustainability

$$S_t^* = \sum_{j=0}^{J} P_{jt}\tau_{jt}^* = \mathrm{P}_t\mathrm{T}_t^*$$

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t^*(1+r)^{t_0-t} + SG_{t_0}$$

$$D_{t_0+1} = \sum_{t=t_0+1}^{\infty} S_t^*(1+r)^{t_0+1-t} + SG_{t_0+1}$$

Eq. 6 and 7

1. Cycle effect: Once the cycle is smoothed *S* becomes *S**

As long as <u>we move the starting year</u>:

2. Debt effect, as long as windfall looses make not true that

$$D_{t_0+1} = D_{t_0} - S_{t_0}$$

3. Discounting effect: small but increasing with period.
Present surpluses pass and future deficits approach

$$D_{t_0} = \mathrm{P}_{t_0}\mathrm{T}_{t_0} + \mathrm{P}_{t_0+1}\mathrm{T}_{t_0} + \sum_{t=t_0+2}^{\infty} \mathrm{P}_t\mathrm{T}_{t_0}^* + SG_{t_0}$$

$$D_{t_0+1} = \mathrm{P}_{t_0+1}\mathrm{T}_{t_0+1} + \sum_{t=t_0+2}^{\infty} \mathrm{P}_t\mathrm{T}_{t_0+1}^* + SG_{t_0+1}$$

Eq. 6’ and 7’

4. Demographic effect:
Due to changes in the initial demographic structure

Obtaining the pure policy effect

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t\,(1+r)^{t_0-t} + SG_{t_0} \qquad (1')$$

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t^*\,(1+r)^{t_0-t} + SG_{t_0} \qquad (6)$$

$$D_{t_0+1} = \sum_{t=t_0+1}^{\infty} S_t^*\,(1+r)^{t_0+1-t} + SG_{t_0+1} \qquad (7)$$

$$D_{t_0} = \sum_{t=t_0+1}^{\infty} S_t^*\,(1+r)^{t_0+1-t} + SG_{t_0+1} \qquad (8)$$

$$D_{t_0} = \sum_{t=t_0+1}^{\infty} \sum_{j=0}^{J} P_{j,t_0}\,\tau_{j,t_0+1}\,(1+r)^{t_0+1-t} + SG_{t_0+1} \qquad (9)$$

1. <u>Cycle effect</u>: SG (1') - SG (6)

Compute series of SG in (8)
(8=7 replacing each D by constant D in t0)
2. <u>Wealth effect</u>: SG (6) - SG (8)

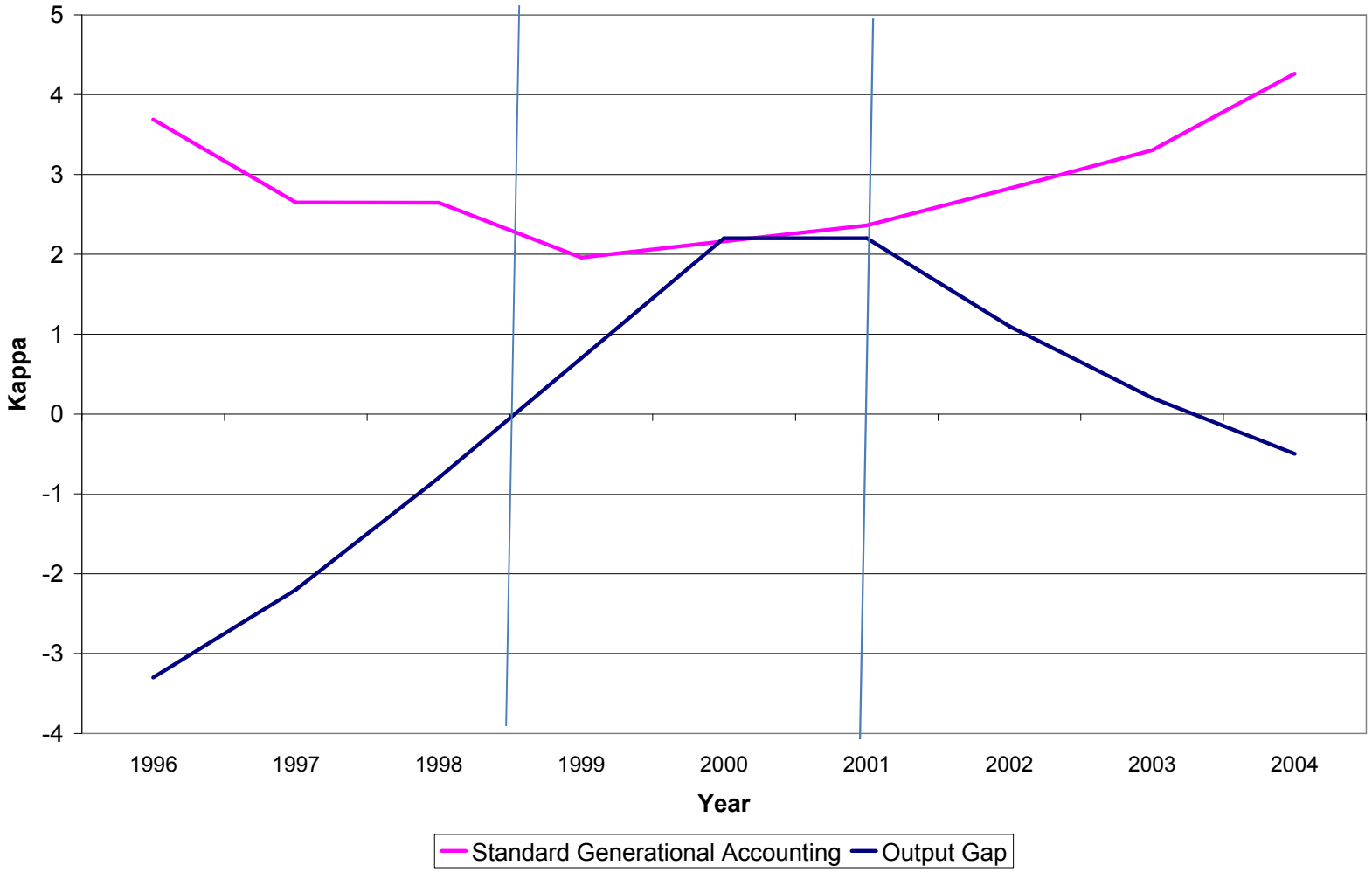
Compute series of SG in (9)
(9) holds *t-1* population structure constant
3. <u>Demographic effect</u>: SG (8) - SG (9)

<u>Pure policy</u> as residual = total effect –cycle-wealth-demographic, or (9)-(2,*t-1*)

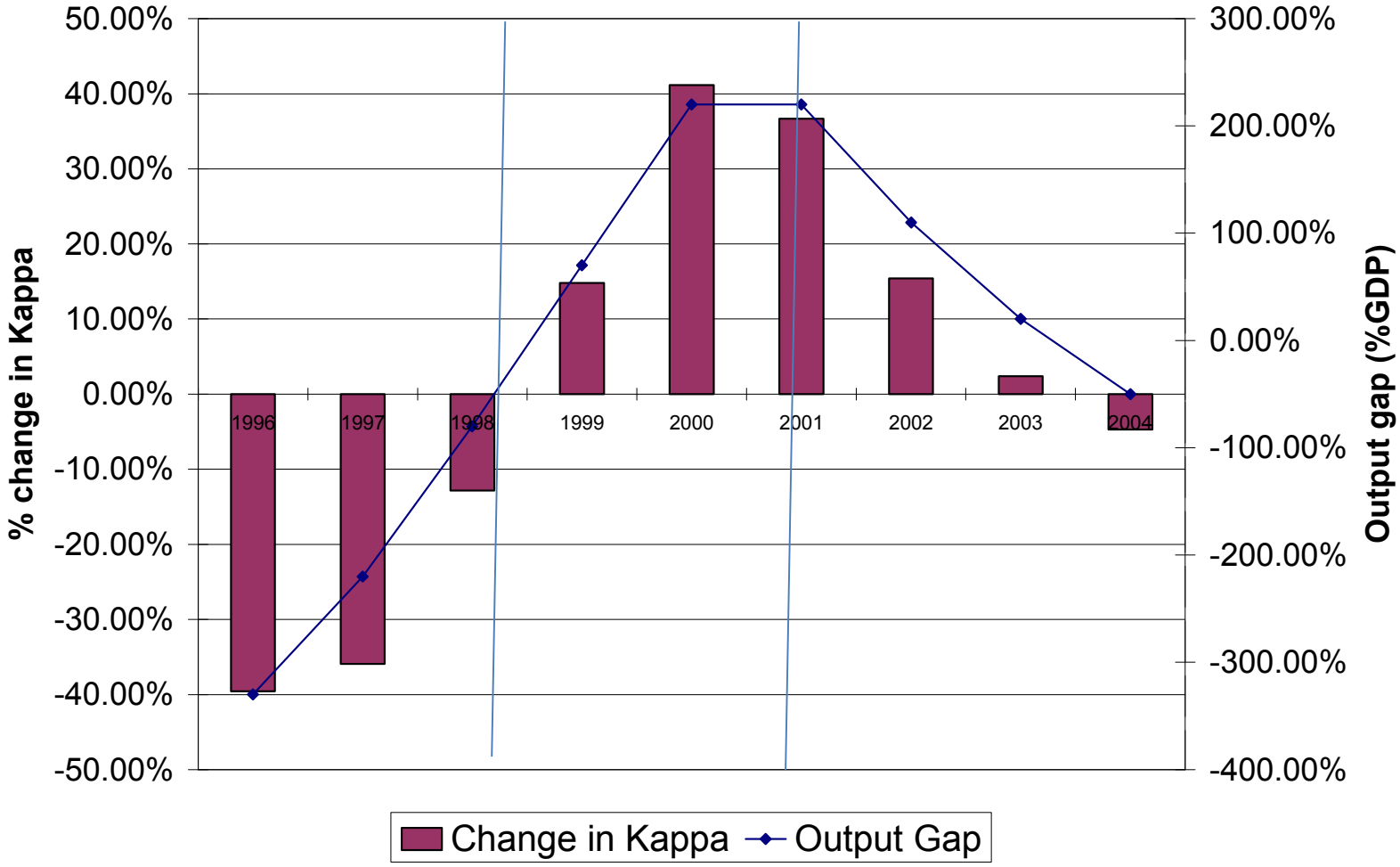
An application to the Spanish case

- Data needs:
  - Population projections INE 2005 (extended final horizon).
  - Aggregates (IGAE 1998-2003) reclassified to refer to,
  - Micro profiles
- Base year 1996, updated aggregates till 2004
- Results:
  - Cycle correction matters
  - *k* more informative than *SG* as it also captures effect on GPD. Sometimes different signs: demographic effect (due to migration!)
  - Positive windfall except last period (both *k* and *SG*, but *SG* gives the absolute value)
  - Policy effect
    - Similar values and the same direction.
    - The most important together with the cycle effect
    - Expansive phase (OGap improving) only two episodes of policy improvement
    - ¿No such consolidation process at least not due to pure policy effects?
      - Positive policy effects in 97 and 99 reflect fiscal consolidations
      - Positive policy effect –according to the budget balance- offset by the increase in age related expenditure

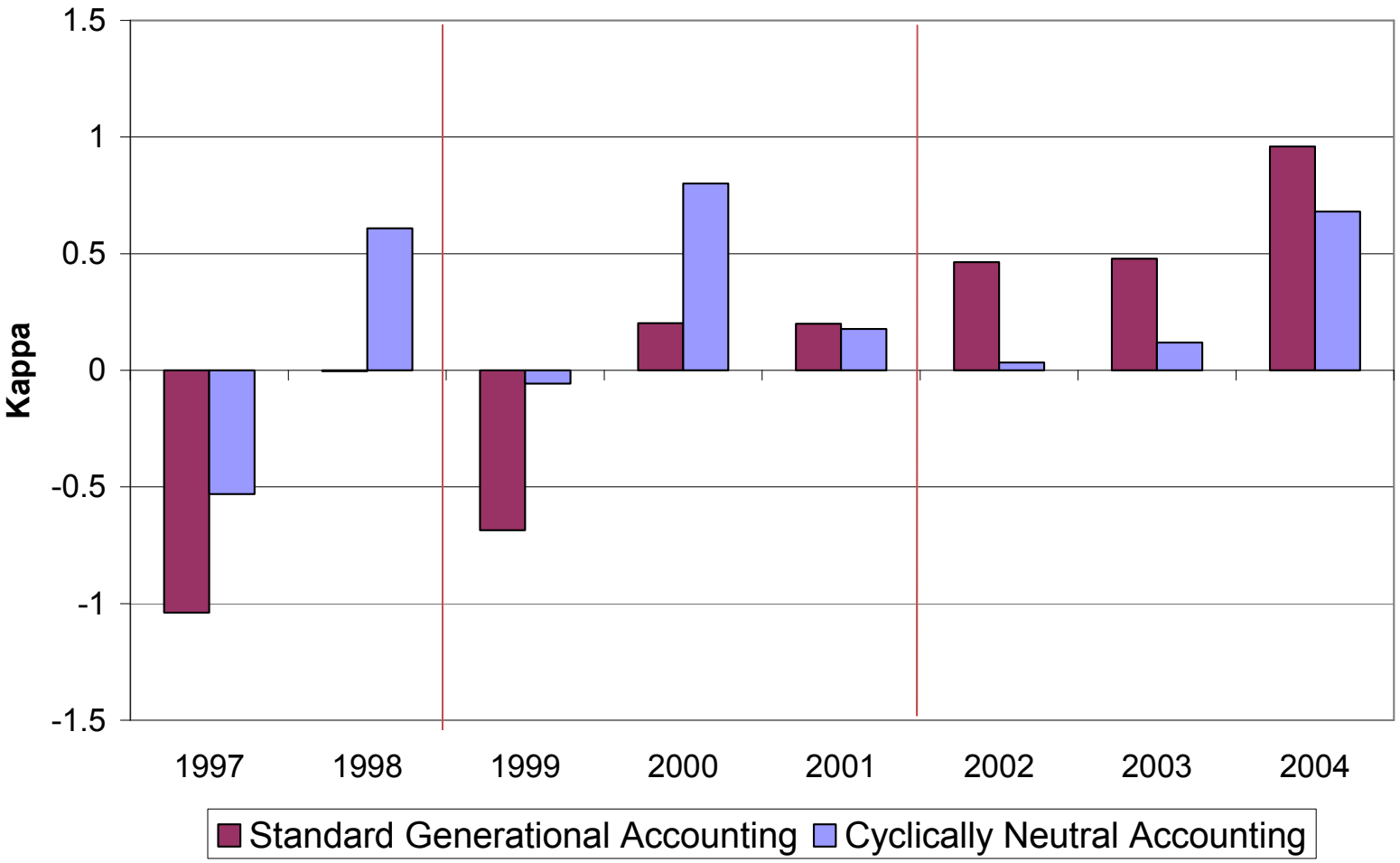
Evolution of the SG and in the output gap (%)



Evolution of the SG and in the output gap



Standard vs. cyclically neutral Generational Accounting (Differences)



Decomposition of Changes in –cyclically neutral- Fiscal Sustainability Indicator

1. Kappa

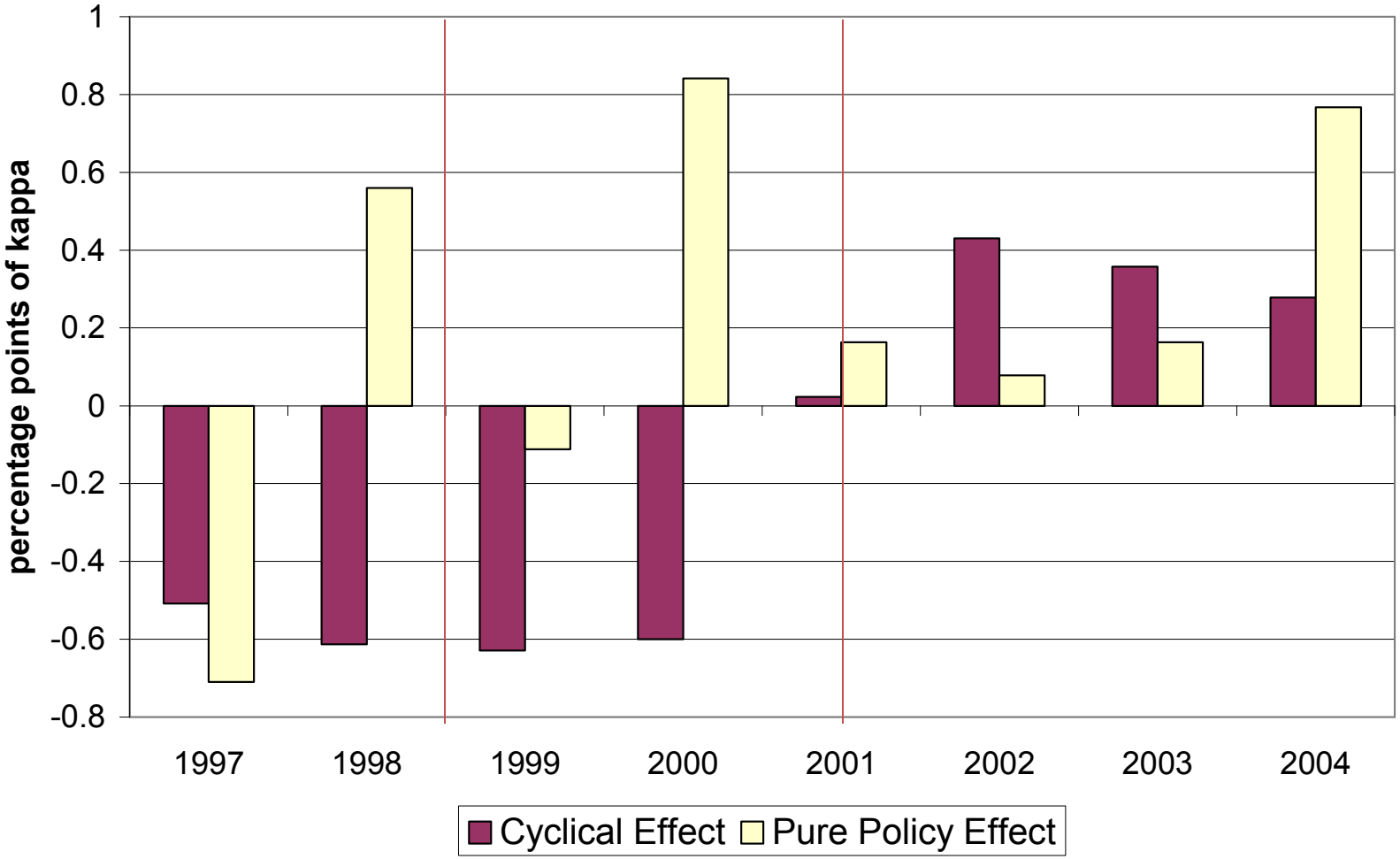
a) series of sustainability indicators

	1. (Eq 1)	2. (Eq 6)	3. (Eq 8)	4. (eq 9)
	Current budget	Cyclically neutral (CN)	CN previous debt	CN previous debt and population
1996	3.68938	2.22908		
1997	2.65045	1.69844	1.53564	1.51954
1998	2.64632	2.3068	2.25293	2.25829
1999	1.96023	2.25007	2.20052	2.19494
2000	2.1623	3.05187	2.98921	3.09149
2001	2.36249	3.22906	3.16545	3.21463
2002	2.82654	3.26221	3.24658	3.30749
2003	3.30418	3.38222	3.36353	3.42602
2004	4.26339	4.06272	4.06804	4.14943

b) Isolating the policy effect

	Δ1-Δ 2	2-3	3-4		Δ1
	Cyclical Effect	Wealth Effect	Demographic Effect	Policy Effect	Total Effect
1997	-0.50829	0.1628	0.0161	-0.70954	-1.03893
1998	-0.61249	0.05387	-0.00536	0.55985	-0.00413
1999	-0.62936	0.04955	0.00558	-0.11186	-0.68609
2000	-0.59973	0.06266	-0.10228	0.84142	0.20207
2001	0.023	0.06361	-0.04918	0.16276	0.20019
2002	0.4309	0.01563	-0.06091	0.07843	0.46405
2003	0.35763	0.01869	-0.06249	0.16381	0.47764
2004	0.27871	-0.00532	-0.08139	0.76721	0.95921

Decomposition of Changes in –cyclically neutral- Fiscal Sustainability Indicator



Only in two periods there have been pure fiscal policy consolidation There have been only

Decomposition of Changes in –cyclically neutral- Fiscal Sustainability Indicator

2. Sustainability Gap

a) series of sustainability indicators

	1. (Eq 1)	2. (Eq 6)	3. (Eq 8)	4. (eq 9)
	Current budget	Cyclically neutral (CN)	CN previous debt	CN previous debt and population
1996	770,443	481,378		
1997	577,732	378,545	342,261	328,150
1998	605,230	531,835	519,416	503,324
1999	469,269	534,910	523,130	506,047
2000	557,853	770,403	754,587	734,941
2001	634,668	848,792	832,069	811,491
2002	786,437	897,779	893,477	869,407
2003	955,281	975,891	970,500	942,861
2004	1,283,240	1,228,986	1,230,596	1,197,260

b) Isolating the policy effect

	Δ1-Δ 2	2-3	3-4		Δ1
	Cyclical Effect	Wealth Effect	Demographic Effect	Policy Effect	Total Effect
1997	-89,878	36,284	14,111	-153,228	-192,711
1998	-125,792	12,419	16,092	124,779	27,498
1999	-139,036	11,780	17,083	-25,788	-135,961
2000	-146,909	15,816	19,646	200,031	88,584
2001	-1,574	16,723	20,578	41,088	76,815
2002	102,782	4,302	24,070	20,615	151,769
2003	90,732	5,391	27,639	45,082	168,844
2004	74,864	-1,610	33,336	221,369	327,959

Conclusions

- A key methodological innovation into generational accounting: Incorporating cyclically adjusted balances into the forward-looking budget projections:
  - We isolate pure policy effects,
  - We also show that a demographic effect and a debt effect may drive fiscal sustainability measures over time and
  - Establish a routine to control for these effects in the generational accounting framework.
  - Which render comparisons across time and countries of the fiscal sustainability indicators obtained truly meaningful

- An empirical application for Spain illustrates:
  - The proposed decomposition of indicators is empirically relevant
  - Standard generational accounting suggests that fiscal sustainability in Spain improved substantially in preparing for the EMU. However, calculation of the pure policy effects reveals that this actually has not been the case

Thanks
for your attention