Disability and the Economy

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Gen Re Africa

Overview

- Background
- Earlier studies
- Data
- Results, Model
- Predictions

Why are we doing this study?

- Interesting
- Topical
- Effects our pricing and reserving
- Hope it will add value to (South African) Life insurers

Background to disability

- Limited social security
- Lump-sum and Income
- Group and Individual
- Improved claims management from late 90s
- Long period of stable economic growth
- High unemployment

A matter of choice

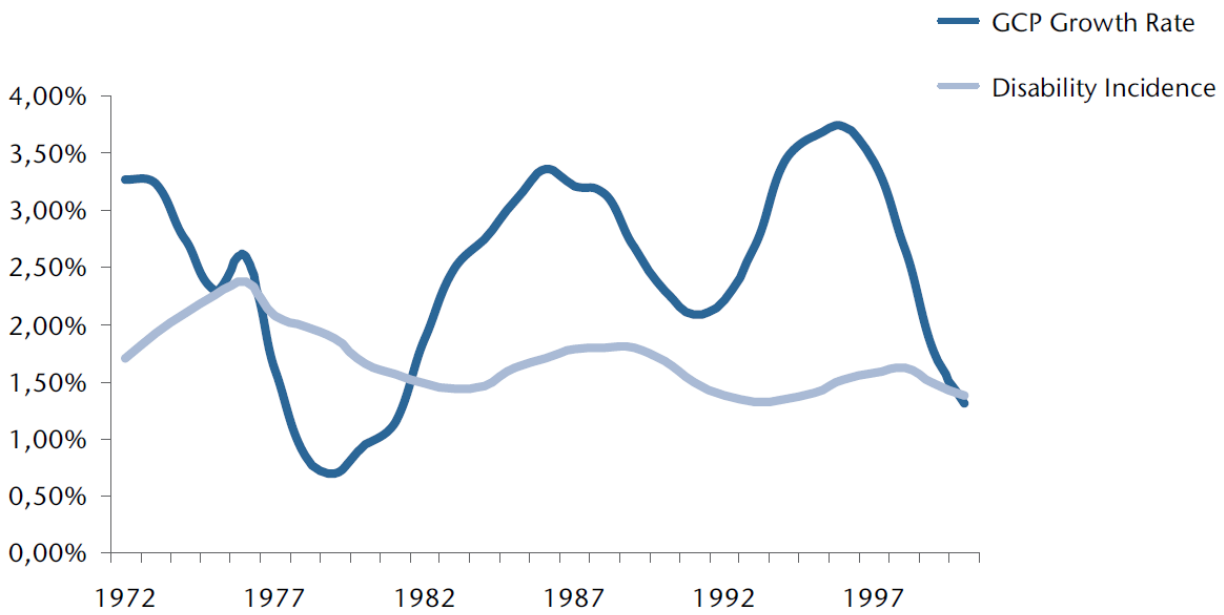
- Claim not something that simply *is*
- Borderline claims:
  - Policyholder: Claim when utility from disability benefits exceeds that of working
  - Employer: Encourage as alternative to retrenchment
  - Insurer / State: Consider reputation vs. claim cost

Earlier Studies

- A number have been done
- Most concluded a link does exist
- Few able to statistically quantify the relationship
- But what is the direction of relationship?

Pro-Cyclical

- Economy up, disability rates up
- Netherlands



Anti-Cyclical

- Economy up, disability rates down
  - The “hidden disabled”
  - Fraudulent claims
  - Minor claims
  - Employer cost control

- USA in the 70’s
- Excellent paper by Donald Doudna (1977)

Interesting impacts in current financial crisis

- Less claims than expected
  - People can't afford to get < 100% of salary
  - People were retrenched too quickly to

- But we still expected to see anti-cyclical pattern in South Africa

Technical Investigation

- 2008/2009 extreme years for economy
- Extreme reaction in disability rates?
  - Increase decrease?
  - 10% / 20% / 30%?
- Set out to
  1. Prove the link exists
  2. Quantify that link
  3. Predict the future

Disability Data

- 1990 – 2008
- 5 contributing insurers
- Both lumpsum and income

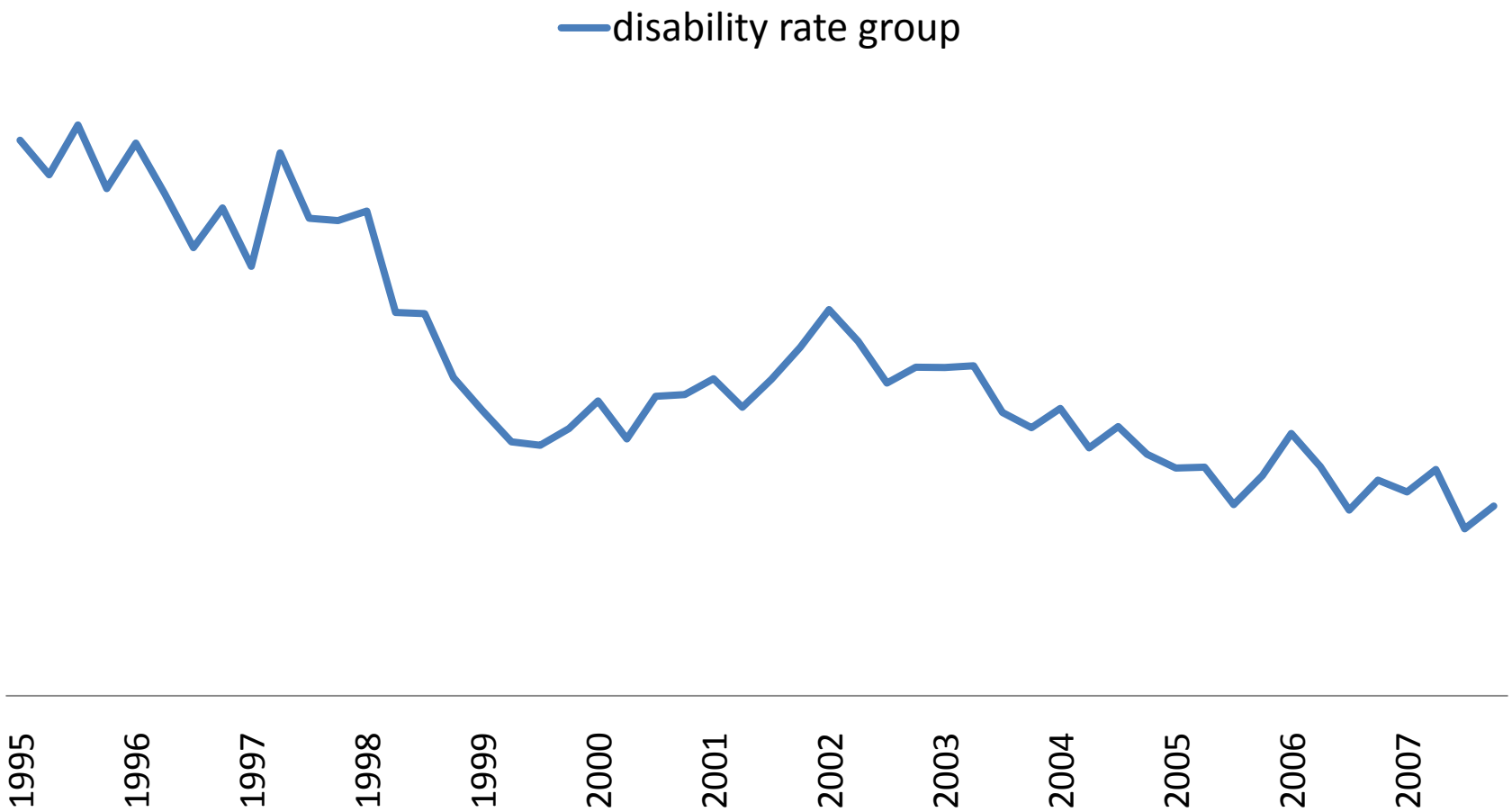
	Period	Life Years	Claims
Individual	1990 - 2008	12,327,727	11,253
Group	1995 - 2008	11,550,626	38,259

- About 1.4m life years per year

Results

- Considered group and individual separately
- Group
  - Some interesting observations, no modelling
- Individual
  - Detailed modelling results produced

Group Disability Rates



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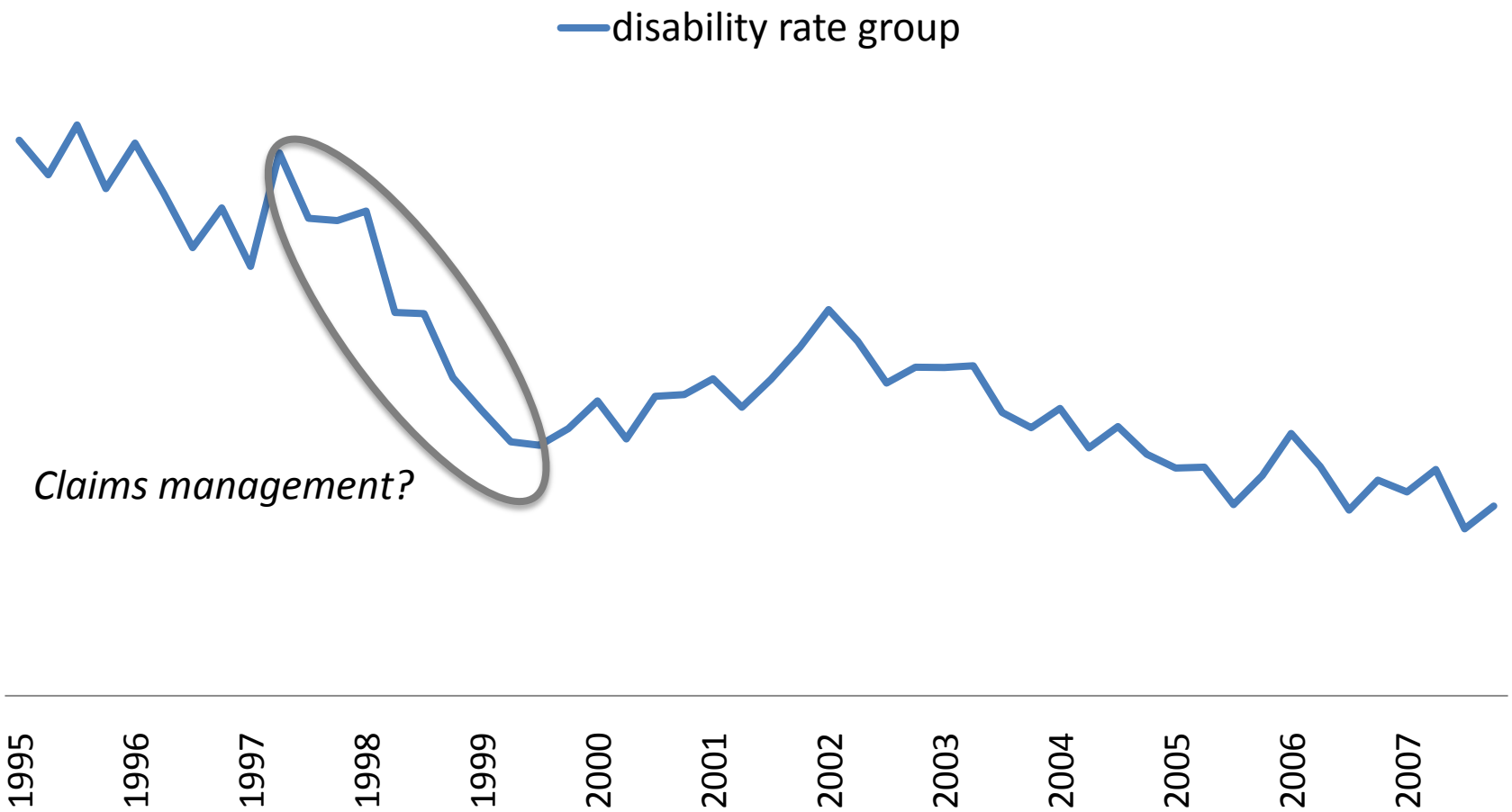

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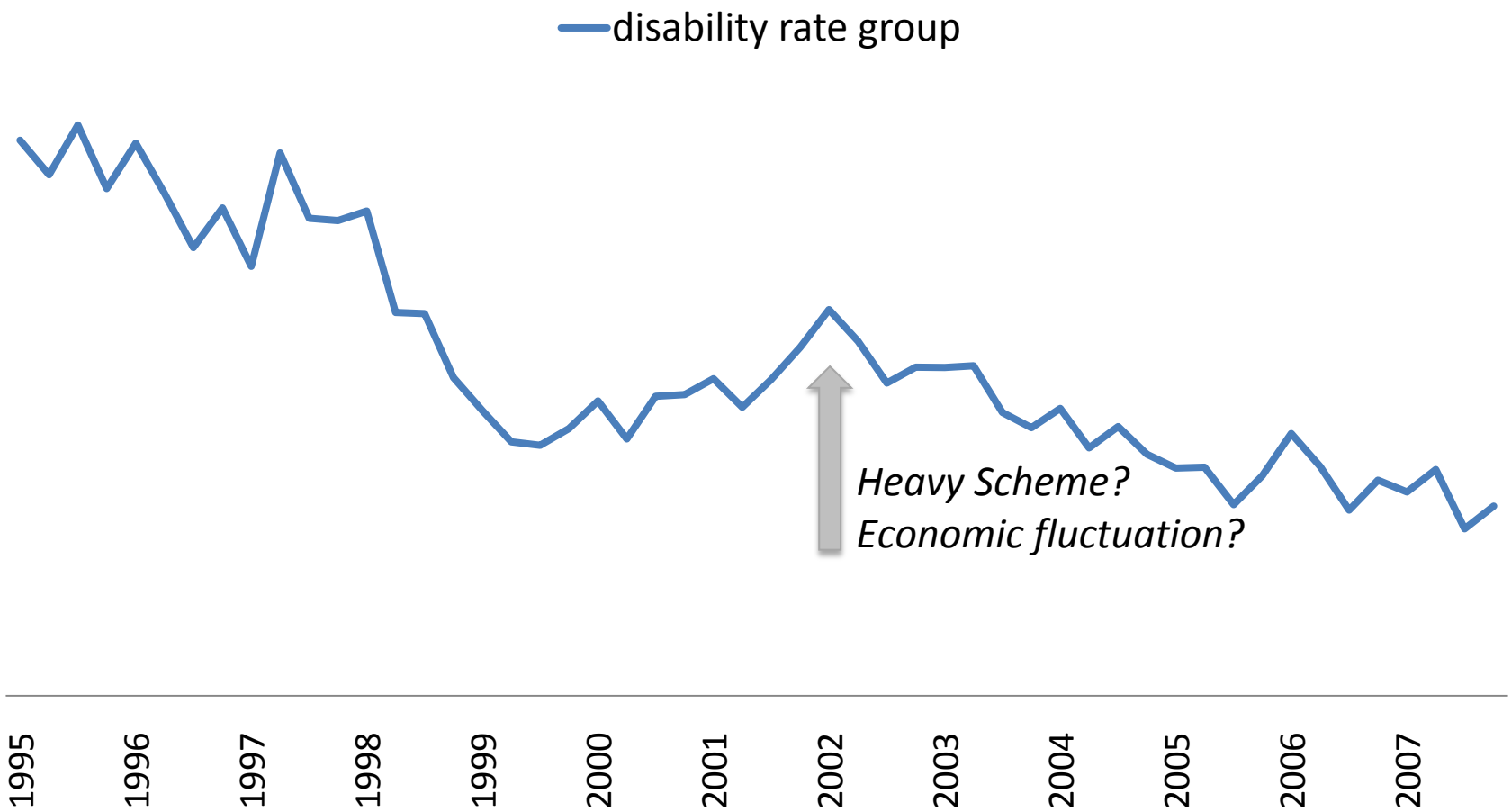

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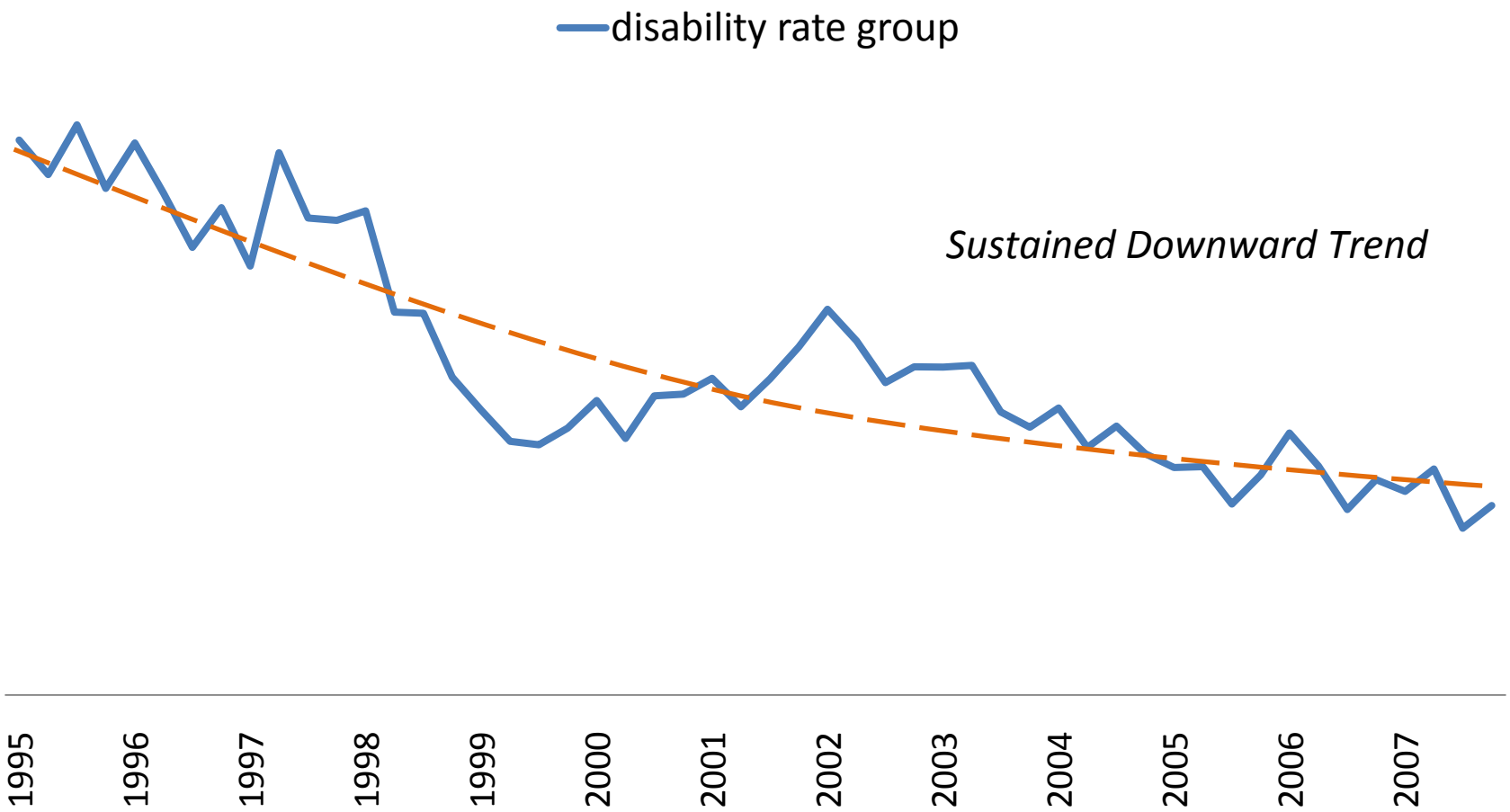


StatsSA Household Survey

- Employment 1995 – 2008

	1995	2008	Growth
Agriculture	1.30m	0.80m	-38%
Mining	0.45m	0.35m	-22%
Financial	0.65m	1.70m	162%
Retail	1.75m	3.00m	71%

- Changes underlying risk pool
- More white collar = fewer claims

Group Salary Progression

	Average Age	% Male	Average Real Salary
2000	40	63%	86,123
2002	40	63%	90,530
2004	40	68%	94,345
2006	41	68%	107,945
2008	41	66%	112,073

- 30% increase in *real* salaries since 2000
- Might reflect movement to financial services

Group Portfolio – Expected Rate Change

	Blue collar : White collar	Average Salary	Rate	Expected rate
2000	60 : 40	86,123	3.1	3.3
2008	40 : 60	112,073	2.2	2.3
%change		*30%*	*-29%*	*-26%*

- Decrease in rate consistent with expected

Group Disability - Summary

- Downward trend caused by change in portfolio
- …driven by structural changes in the economy

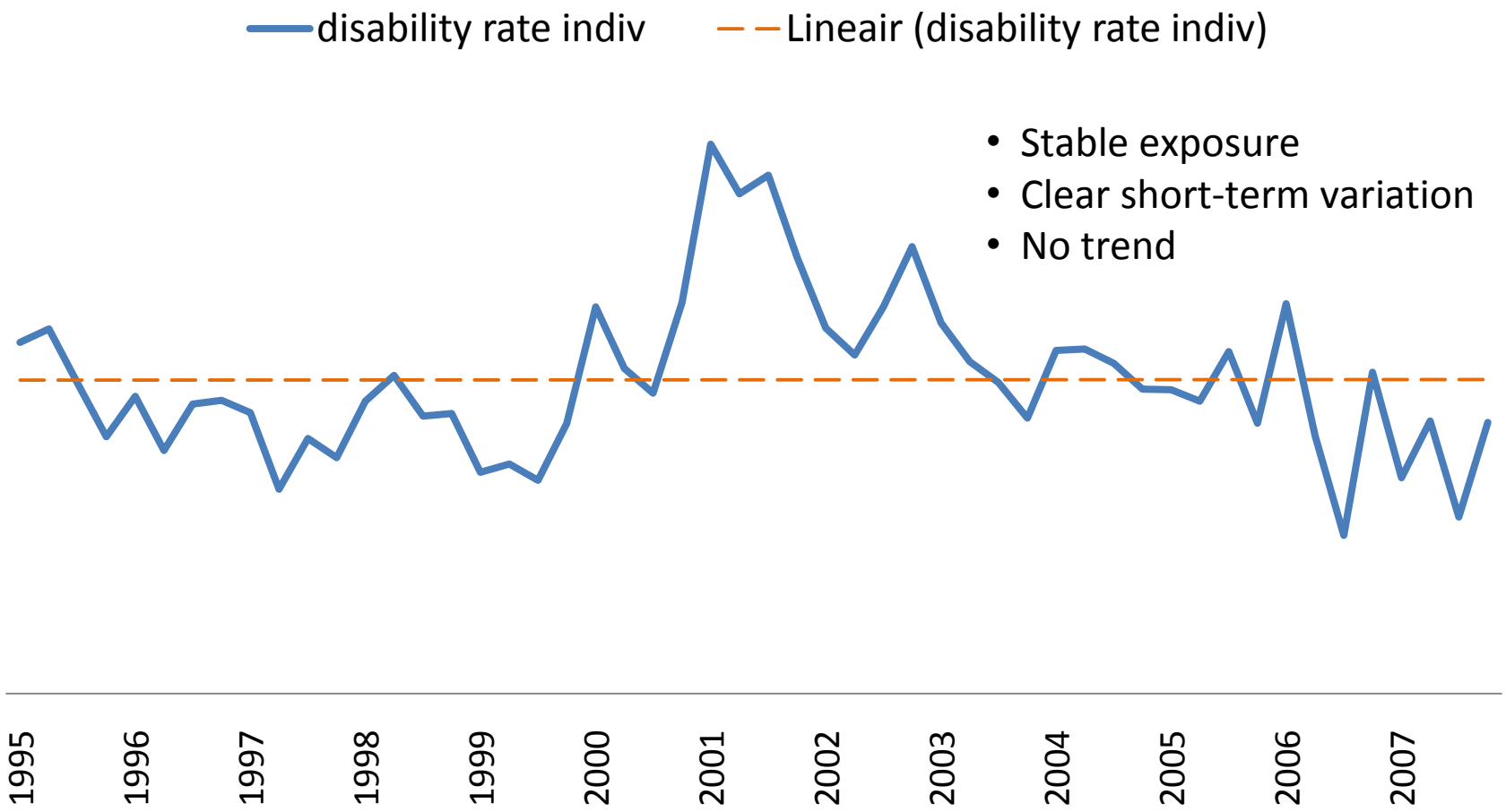
- Next step to do more complex modelling

Individual Disability

- Largely self-employed, high net worth individuals
- Fewer problems with data
- More stable exposure

- Able to do more complex modelling

Individual Disability Rates

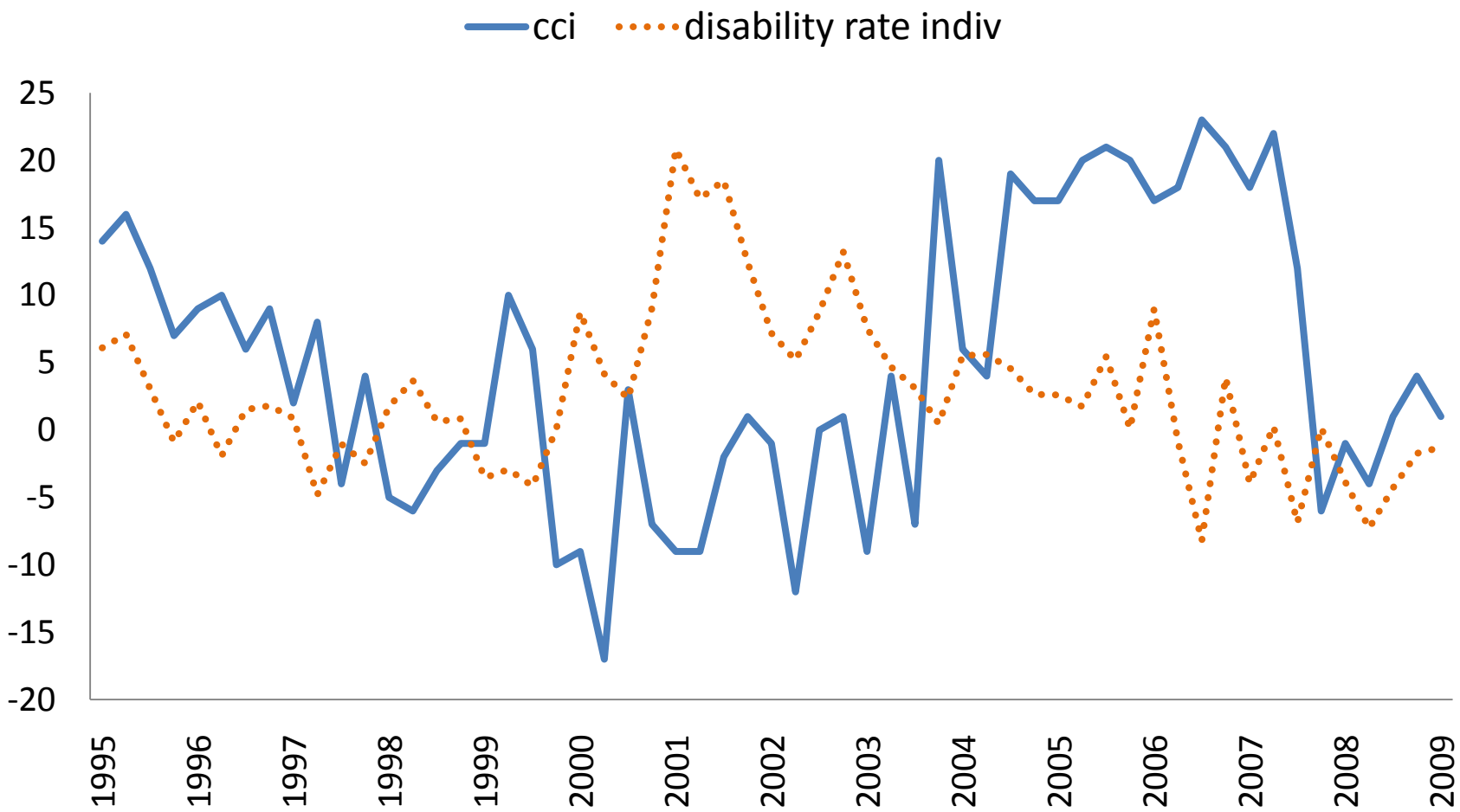


Economic Data

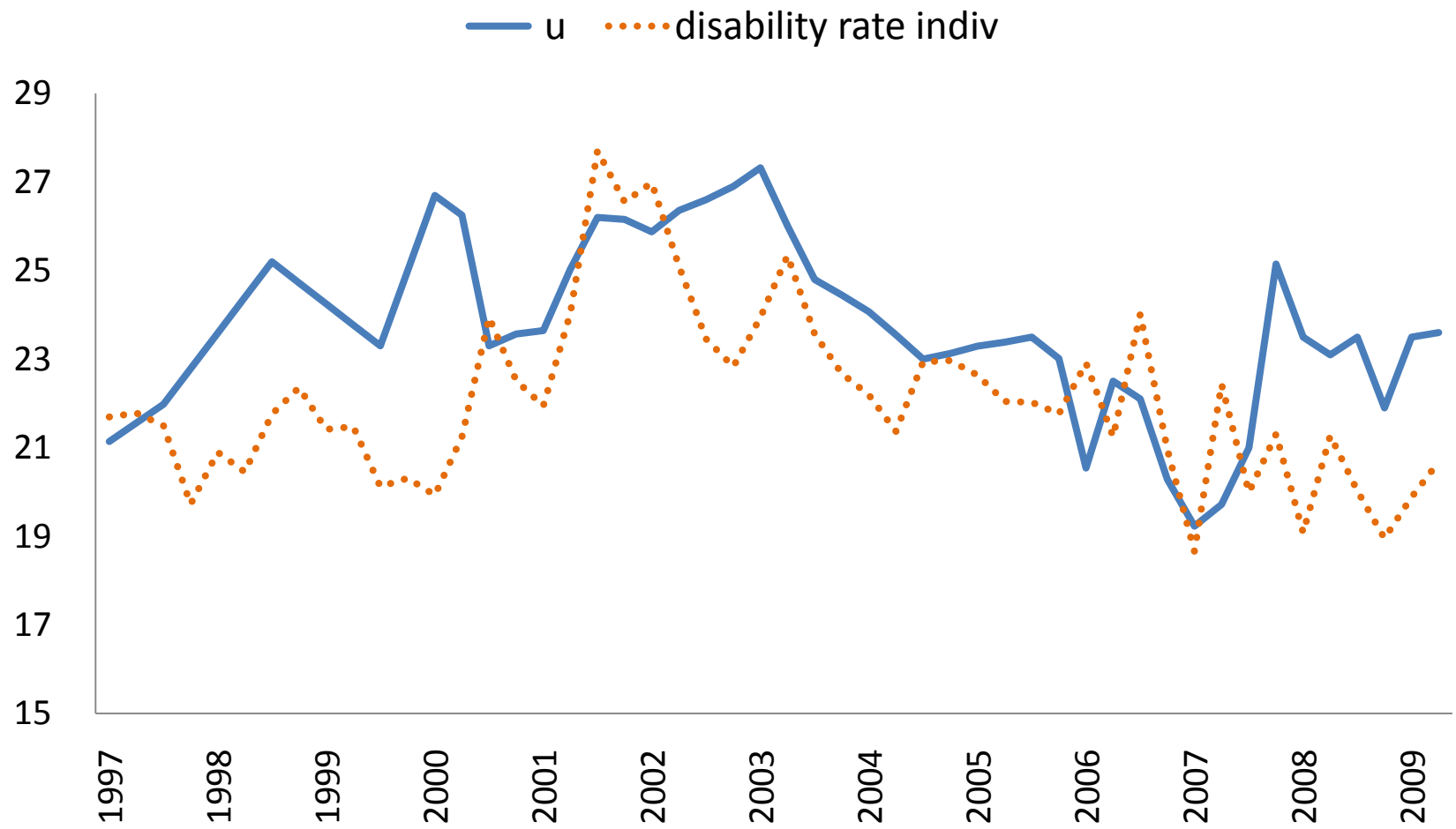
- Economic indices criterion
  - Publicly available
  - Frequently published
  - Available over long enough time period

- Use to model disability rates

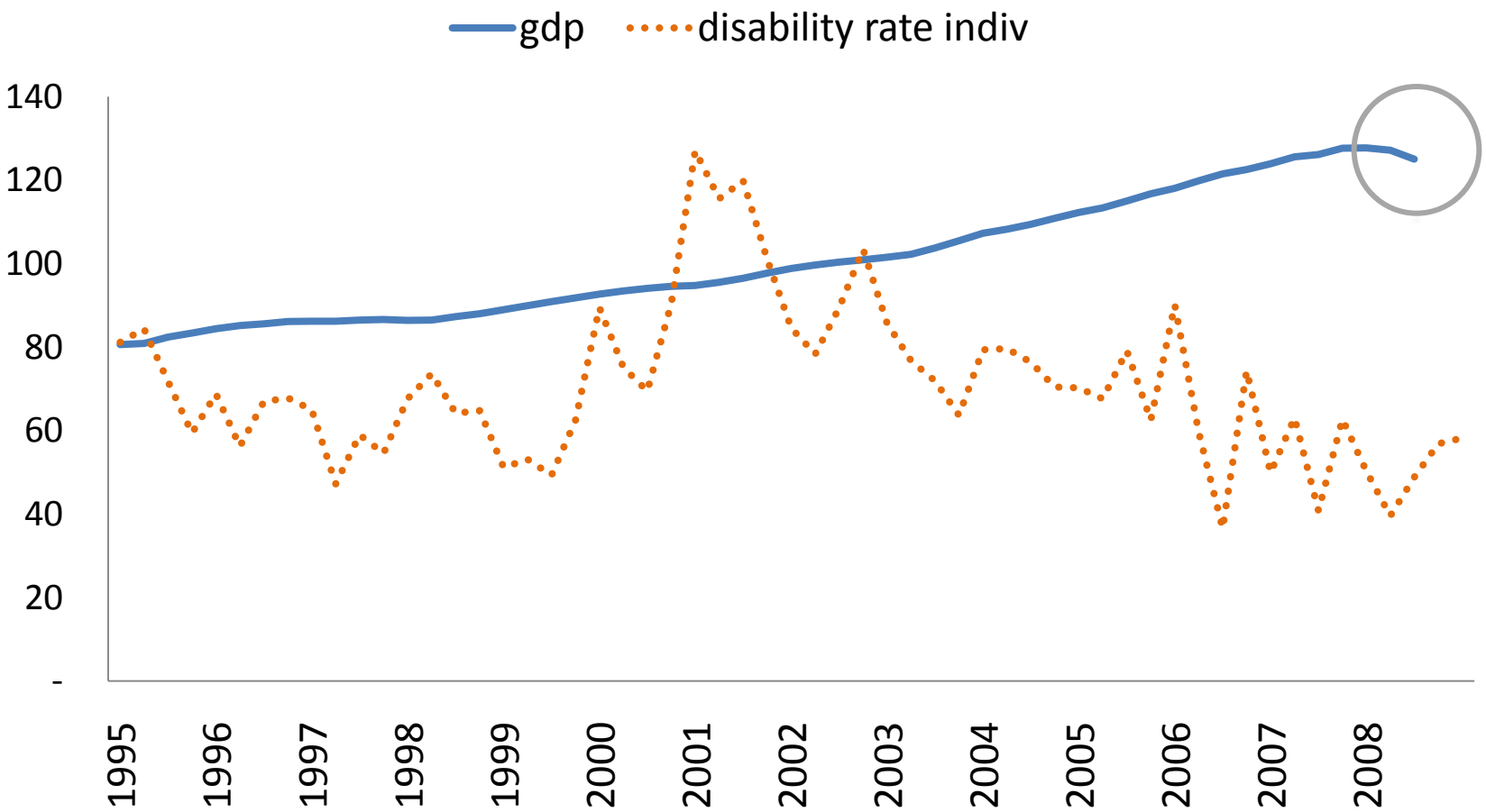
Disability and Consumer Confidence



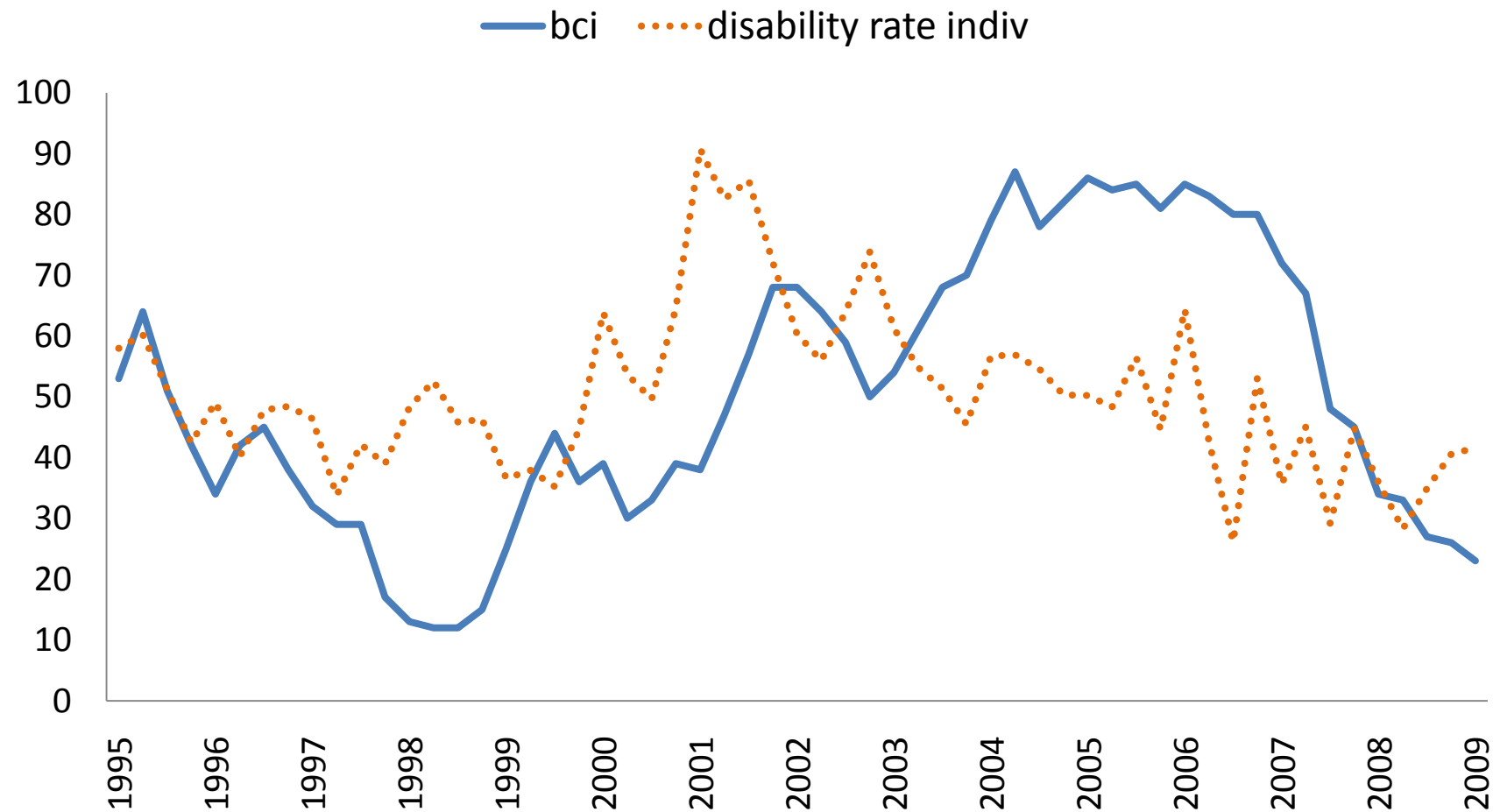
Disability and Unemployment



Disability and GDP



Disability and Business Confidence



Univariate Modelling

- Disability a function of one indicator
- Identify strongest indicators
  - Unemployment and Consumer Confidence
- Determine appropriate lags
  - Disability rates do not react immediately

Lag determination

- Lag with highest R-square for U and CCI
- Assumption for BCI and GDP

	R-square			
Quarters Lag	**CCI**	**U**	**BCI**	**GDP**
0	12%	22%	2%	6%
1	12%	***25%***	0%	***6%***
2	14%	24%	***0%***	6%
3	21%	19%	1%	7%
4	***27%***	15%	2%	7%

Multivariate Modelling

- Disability a function of multiple indicators
- Used lags already identified

Indicators used	R-square
U + CCI + BCI + GDP	52%
U + CCI + BCI	50%
U + CCI	33%

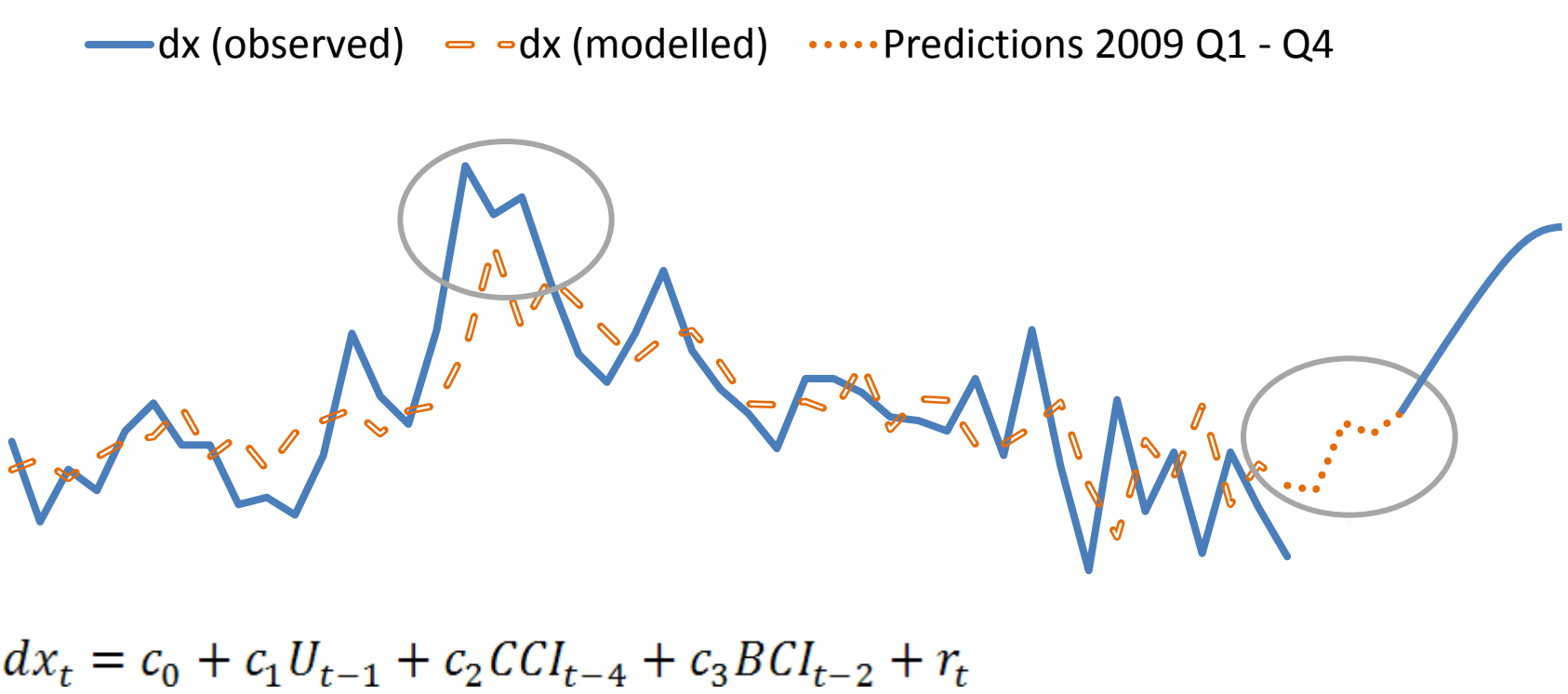
- GDP offers no useful information
- …but BCI does

Final Model

- Final model a function of:
  - U at lag 1
  - CCI at lag 4
  - BCI at lag 2
- …and
  - Disability rate in previous period

- R-square of 49.89%
  - What about the remaining 50%?

Model vs Observed



$$dx_t = c_0 + c_1 U_{t-1} + c_2 CCI_{t-4} + c_3 BCI_{t-2} + r_t$$

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Predictions

	Observed rate	Modelled rate	
2002	1.24	1.22	
2003	1.14	1.11	
2004	0.95	0.94	
2005	0.92	0.97	
2006	0.94	0.87	
2007	0.72	0.72	
2008	0.62	0.77	+7%
2009	?	0.84	+11%

- Observed rates have declined in 2008
  - IBNR?
  - First sign that expected effect not occurring?

Conclusion

- Statistical evidence that the link does exist
- Model suggests 7% and 11% increase in 2008 and 2009

- What actually happened?
  - Re-evaluate model in 2010/2011

- Will we be ready next time around?

Cape Town Afrique du Sud

ICA 2010 CIA

Questions?

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