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Danmarks Nationalbank

**Estimates of the Danish general  
government budget balance and the  
cyclical budget volatility  
1875-2003**

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# **Estimates of the Danish general government budget balance and the cyclical budget volatility 1875-2003<sup>1</sup>**

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October 2005

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<sup>1</sup> The author wishes to thank colleagues from Danmarks Nationalbank for useful comments on preliminary versions of this paper. The author alone is responsible for any remaining errors.

# Estimates of the Danish general government budget balance and the cyclical budget volatility 1875-2003

## Abstract

The paper presents time series for Danish general government net lending in the period 1875-2003 and analyses the long-term term fiscal development in Denmark. Even though Denmark today has one of the largest public sectors in Europe, relatively speaking, the Danish general government's deficit has only significantly exceeded 3 per cent of GDP during World War II and in the early 1980s. Furthermore, the cyclical impact on the general government budget balance seems most often to be relatively modest compared to that of discretionary fiscal-policy changes. However, calculations on the cyclical budget volatility also seem to suggest that the cyclically adjusted budget balance has to be in surplus in periods with strong economic growth if the automatic stabilisers should be allowed to work freely during a cyclical downturn without violating a 3-per-cent budget criteria (the reference value in the Maastricht Treaty).

*Key words:* Historical statistics, cyclical adjustment, government budget, business cycles, fiscal policy, Maastricht Treaty.

*JEL Classification:* E32; E62; N23; N24.

## Resumé (Danish summary)

I papiret præsenteres tidsrækker for den danske offentlige sektors nettofordringserhvervelse i perioden 1875-2003. Endvidere analyseres den langsigtede udvikling i de offentlige finanser i Danmark. Selv om den offentlige sektor i Danmark i dag relativt set er blandt de største i Europa, har det offentlige budgetunderskud kun markant oversteget 3 pct. af BNP under 2. verdenskrig samt i begyndelsen af 1980'erne. Konjunkturernes indflydelse på den offentlige budgetsaldo er normalt forholdsvis beskeden sammenlignet med påvirkningen fra diskretionære finanspolitiske ændringer. Dog antyder beregninger af udsvingene i de offentlige budgetter også, at det er nødvendigt at have overskud på den konjunkturrensede offentlige budgetsaldo i perioder med høj økonomisk vækst, såfremt de automatiske stabilisatorer skal have mulighed for at fungere frit i perioder med lav økonomisk vækst uden at budgetunderskuddet overskrider en grænse på 3 pct. af BNP (som er referenceværdien i Maastricht Traktaten).

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## **1. Introduction**

Denmark has a long tradition for pursuing a fixed-exchange-rate policy: In the pre-World War I period within the Classical Gold Standard, in the inter-war period first within the global gold-exchange system and later vis-a-vis the U.K., and finally in the post-World War II period first within the Bretton Woods system and later the European exchange-rate co-operation.<sup>2</sup> The ability to pursue a creditable fixed-exchange-rate policy depends to a very high degree of the fiscal policy being sustainable. Also in other monetary regimes a sound fiscal policy is a necessary pre-condition in order to manage inflation expectations in line with a final objective of price stability.

The paper at hand studies the long-term fiscal development in Denmark. The aim is to throw some light on to what extent the annual changes in the general government budget balance can be attributed to cyclical factors or to budgetary impacts from discretionary fiscal policy changes.

The existing versions of Danish historical national-account statistics do not include a full split of the total economy into a public and a private sector with corresponding net lending figures. An important purpose of this paper is therefore to make a first crude attempt to overcome this data shortage by constructing time series for the general government budget balance (net lending) in the period 1875-2003.

The remainder of this paper is organised as follows: Section 2 describes the main principles used for the compilation of the historical figures for the Danish general government net lending 1875-2003. Section 3 outlines the main trends in Danish public finances since 1875 while section 4 focuses on the cyclical influence on the Danish general government budget balance. Section 5 compares the estimates of the cyclical impact on the general government budget balance calculated in section 4 with results found in earlier studies covering various sub-periods over the time-span 1875-2003. Finally, section 6 summarises the main findings in the paper and indicates areas for further research. The background data related to this paper are listed in Appendix A, while Appendix B outlines the sources and compilation methods in details.

## **2. Historical statistics on the general government budget balance in Denmark - Some methodological remarks and main principles of calculation**

Long time series on net lending by institutional sectors are not readily available in Denmark. At the time of this writing the new version of the official national account statistics –

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<sup>2</sup> For a recent survey of the Danish exchange-rate policy since 1875, see Abildgren (2004).

introduced in 2005 – contains only a consistent breakdown of the total economy into a general government sector and a private sector for the period since 1990. Earlier versions of the official national accounts statistics have covered the period back to 1971. However, none of the existing versions of Danish historical national-account statistics covering the pre-1971 period include a full split of the total economy into a general government sector and a private sector with corresponding net lending figures.<sup>3</sup>

In order to study the development of the general government budget balance in Denmark for a longer period than covered by the current statistics, a set of data covering the period 1875-2003 has therefore been constructed, cf. appendix 1 and 2.

In the data set on general government net lending in appendix 1, the post-1970 figures are based the current and earlier versions of the official national account statistics while the pre-1971 figures are based on accounting statistics for the central government, the local governments and unemployment benefit societies. The applied delimitation of the general government sector is the following:

- In the period 1875-1906 the figures cover only the central government and the local government.
- Public subsidies to unemployment benefits were introduced in 1907. In the period 1907-1970 the figures cover therefore the central government, the local governments and the unemployment benefit societies.
- In 1967 the central government took over the responsibility of financing the share of unemployment benefits not covered by fees from members of the unemployment benefit societies. In the period 1971-1989 the figures for the general government budget balance therefore cover only the central government and the local government, hereby implicitly assuming that the net lending of the unemployment benefit societies is close to zero. In 1990 the net lending of social security funds (e.g. unemployment benefit societies and the Employees' Wage Guarantee Fund) in total amounted to 0.01 per cent of GDP, so the bias resulting from the omission of social securities funds in the period 1971-1989 is believed to be negligible.
- With effect from 1990 the data on general government net lending come from the current official version of the national accounts which include the central government, the local governments and social security funds (e.g. unemployment benefit societies and the Employees' Wage Gurantee Fund) within the general government.

A few comments should be given to the treatment of certain large “special” transactions:

- The proceeds from the sale of the Danish West Indies (87 million kroner) in 1917 are included as revenue in the government net lending.
- The amount paid to Germany (101.4 million kroner) in 1920 as compensation for assets in Sønderjylland (the northern part of the old Duchy of Schleswig) is included as an expenditure item in the government net lending.
- In 1928 an amount of 136 million kroner is included as an expenditure item in the government net lending representing the central governments expenditures in the reconstruction of Den Danske Landmandsbank.

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<sup>3</sup> For an overview of the available historical national-accounts figures in Denmark, cf. pp. 164-179 in Mogensen (1987), Hyldtoft (1993, 1994), Christensen, Hjerpe, Krantz & Nielsen (1995), and Nielsen (2004).

- The German occupation forces expenditures in Denmark during the years 1940-1945<sup>4</sup> - compulsorily financed via German accounts at Danmarks Nationalbank against a guarantee from the Danish central government - were never paid by Germany. The amounts are included as expenditures (debt write-off) in the government net lending as they occurred in the period 1940-1945.

Even though an attempt has been made to transform the figures behind appendix 1 into a set of reasonable consistent long time series, the quality of a data set spanning more than 125 years is to a high degree determined by data availability. The accounting principles applied in central and local government accounting statistics have changed over time and the principles are not fully in accordance with the concepts and definitions applied in the national accounts statistics. This introduces undoubtedly measurement errors, and the figures presented in this paper can only be considered as a first crude attempt to overcome the lack of long-span time series for general government net lending in the existing version of Danish historical national accounts.<sup>5</sup>

### **3. Trends in general government net lending in Denmark 1875-2003<sup>6</sup>**

Chart 1 shows the calculated figures for the general government net lending in per cent of GDP for the whole period since 1875. It is worth to notice that the general government's deficit in per cent of GDP has only significantly exceeded 3 per cent during World War II and in the beginning of the 1980s (the "abyss" debate<sup>7</sup>). Only in three other periods the budget deficit exceeded 3 per cent slightly. In two of these cases special factors played a role:

- In 1910 the budget deficit reached 3.1 per cent of GDP. This year an amount of 6 million kroner (equivalent to 0.3 per cent of GDP) is included as expenditures in the central government net lending representing the central government's pay-in to the liquidation fund of 1910 which were to guarantee deposits in a number of failed banks.
- In 1918 – at the end of World War I – the budget deficit reached 3.6 per cent of GDP

The last case with a budget deficit exceeding the 3-per-cent limit occurred in the years 1993-1994 after 7 years of slow economic growth and a fiscal stimulus to "kick-start"<sup>8</sup> the economy.

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<sup>4</sup> The amounts in million kroner were the following: 1940: 804.6; 1941: 852.6; 1942: 701.7; 1943: 1902.5; 1944: 2728.0; and 1945: 574.1

<sup>5</sup> The treatment of sick benefit associations can be mentioned as an example of one of the measurement errors related to the figures for the general government net lending presented in this paper. Public subsidies to sick benefit associations were introduced in 1892. However, the calculations presented in this paper implicitly assume that the net lending of sick benefit associations are close to zero. The activities of the sick benefit associations were transferred to the local governments in 1973. Hansen (1974) covers the history of the Danish sick benefit associations.

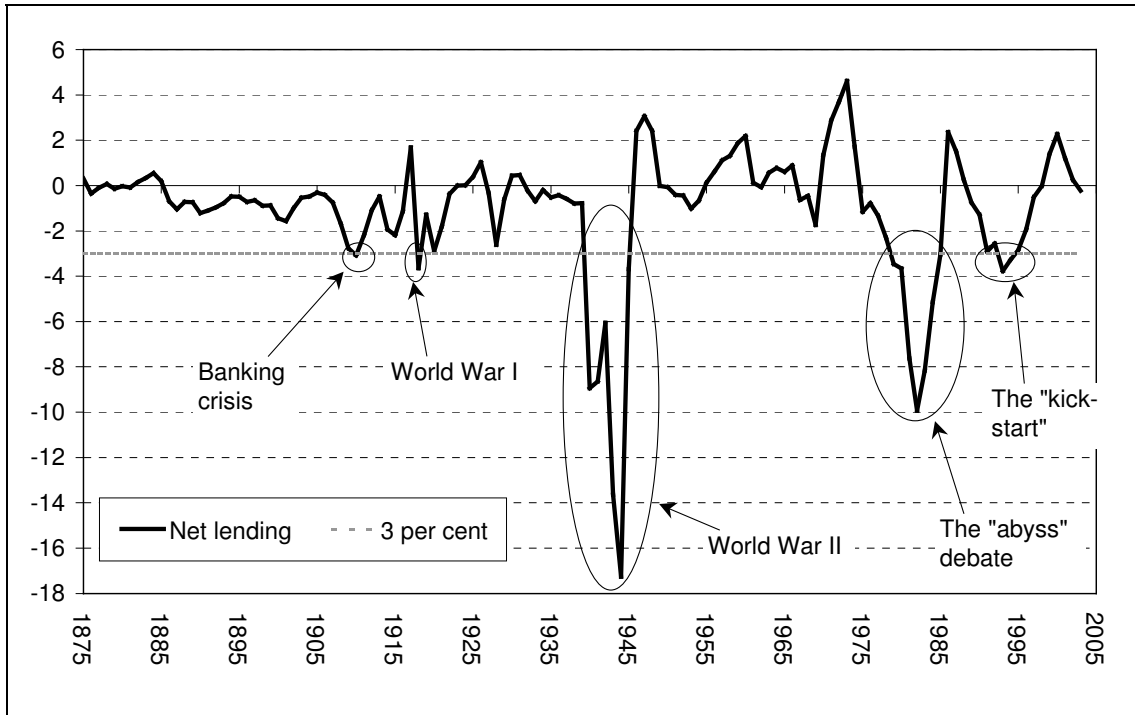
<sup>6</sup> Other long-span studies on the development of the public sector in Denmark are found in e.g. Rasmussen (1972) and Norstrand (1977).

<sup>7</sup> Cf. e.g. the description of the budget crisis in Christensen & Topp (1997).

<sup>8</sup> Also described in e.g. Christensen & Topp (1997).

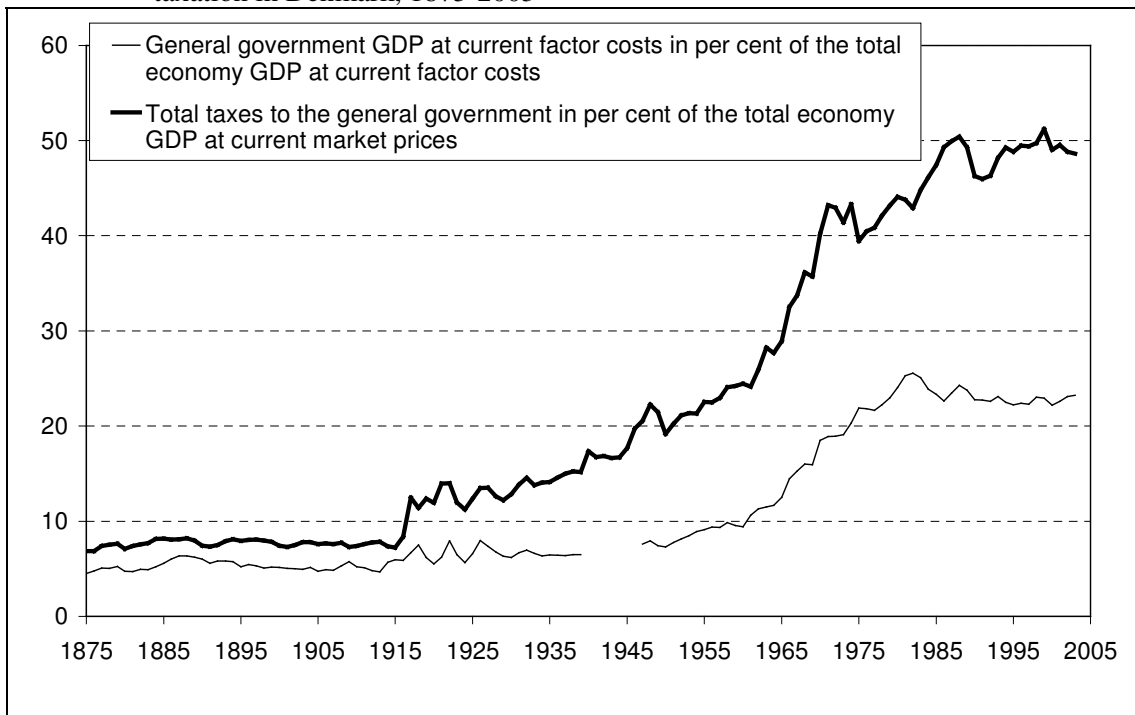


Chart 1: Danish general government net lending, per cent of GDP at current market prices, 1875-2003



Sources and compilation methods: See appendix 2.

Chart 2: Danish general government's share of the total economy and the total level of taxation in Denmark, 1875-2003



Sources: See appendix 2.

Chart 2 shows the general government's share of the total economy and the level of taxation since 1875. Seen as one the period has been characterised by the build up of a large tax-

financed welfare state where the general government accounts for a substantial share of the economy.

Today Denmark has one of the largest public sectors in Europe measured by the total general government expenditures in per cent of GDP. This was not the case in 1870 where the level of government expenditures in e.g. France, Germany, Italy, UK and Austria exceeded that of Denmark, cf. table 1. Even though the Danish general government budget deficit as shown in figure 1 has not exceeded 3 per cent of GDP in most of the period since 1875 it has not prevented the build up of a large public sector.

Table 1: Total general government expenditures in selected EU countries circa 1870 and 2003, per cent of GDP at current prices

	circa 1870	2003
France	12.6	54.5
Germany	10.0	48.8
Italy	13.7	48.9
UK	9.4	43.7
Austria	10.5	50.8
Denmark	8.9	56.1

Sources:

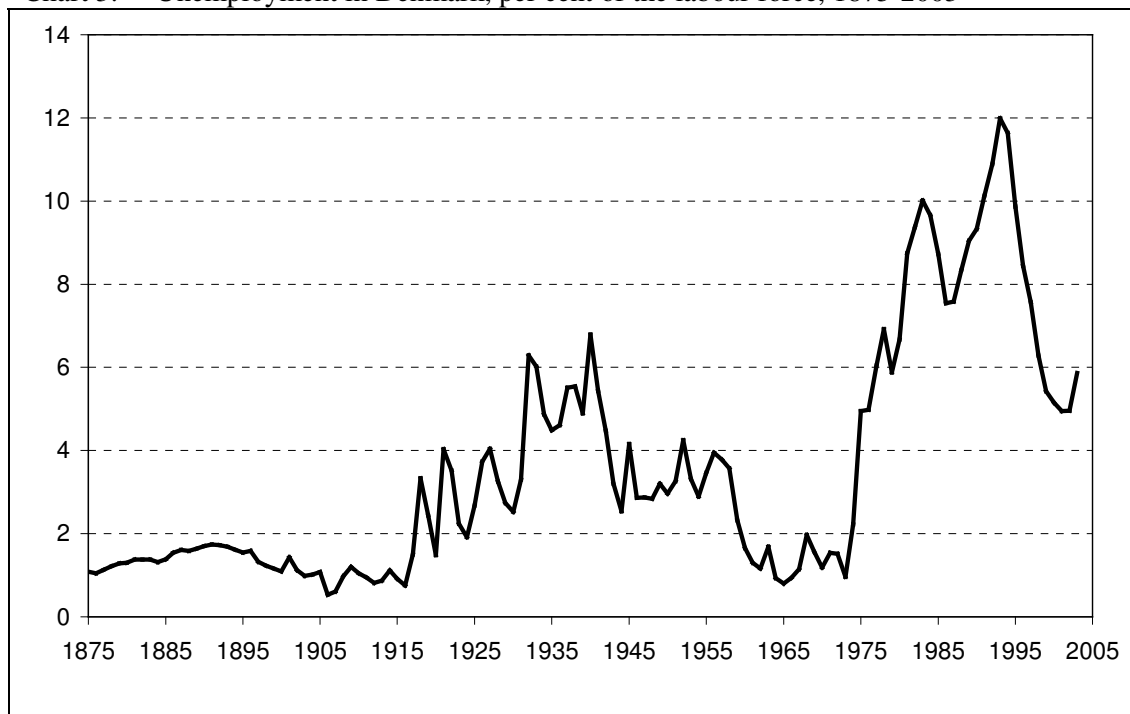
Hansen (1983); OECD (2004); and Schuknecht & Tanzi (2000).

#### **4. Cyclically impact on the general government budget balance**

The government budget balance is influenced by the business cycle due to the so-called “automatic stabilisers”. In periods with strong economic growth and a decline in unemployment the government’s expenditures on unemployment benefits will (at unchanged level of unemployment benefits) decline and the government’s direct and indirect tax revenue will (at unchanged tax level) increase, thereby dampening the economic activity. In periods with slow economic growth and increasing unemployment the government budget balance tend to deteriorate, thereby stimulating the economic activity. At unchanged fiscal policy the automatic stabilisers thus contributes to an improved budgetary position in periods with high economic growth and a worse budgetary position in periods with slow economic growth.

The unemployment rate in Denmark since 1875 is shown in chart 3. Before 1900 the figures have been interpolated based on the number of persons receiving social security benefits from the local authorities in Copenhagen. The fluctuations in the level of unemployment can be considered as a proxy for the cyclical variation of the economy that impacts the government budget balance.

Chart 3: Unemployment in Denmark, per cent of the labour force, 1875-2003



Sources and compilation methods: See appendix 2.

Several different methods can be used to derive cyclically adjusted changes in the general government budget balance. They all have their strength and weaknesses and will usually to a certain extent paint different pictures of the fiscal development. Appendix 1 includes a set of rough calculations of the cyclical impact on the general government budget balance in the period 1875-2003 following a methodological approach inspired by Christensen (1984, 1993).<sup>9</sup> Using the following mnemonics:

$T_t$	Total taxes (million kroner, current prices) received by the general government in year t.
$Y_t$	Total GDP (million kroner, current prices) at factor costs in year t.
$L_t$	Total employment (1000 persons) in year t.
$UB_t$	Total amount of unemployment benefits (million krone, current prices ) paid out by the general government in year t.
$U_t$	Unemployment (1000 persons) in year t.
$a$	Parameter ( $a < 0$ ) representing the change in the number of employed persons (1000 persons) when the number of unemployed persons increase by 1000 persons.
$CA_t$	Cyclical impact (million kroner, current prices) on the change in the general government net lending from year t-1 to year t.

<sup>9</sup> Topp (1995) study the cyclical impact on the general government budget balance 1929-1939 based on an approach close to Christensen (1993). For a discussion and use of other methods to compiled cyclically adjusted budget balances for Denmark for shorter historical time spans, cf. e.g. Andersen (2002), Hansen & Knudsen (1999) and Skaarup (2005).

the cyclical impact on the change in the general government net lending from year t-1 to year t has been calculated as:

$$[1] CA_t = \frac{T_t}{Y_t} \cdot \frac{Y_t}{L_t} \cdot a \cdot (U_t - U_{t-1}) + \frac{T_t}{Y_t} \cdot \frac{UB_t}{U_t} \cdot (U_t - U_{t-1}) - \frac{UB_t}{U_t} \cdot (U_t - U_{t-1})$$

When e.g. the number of unemployed increases ( $U_t - U_{t-1} > 0$ ) the calculation procedure in equation [1] assumes that the government budget is affected by the following three channels:

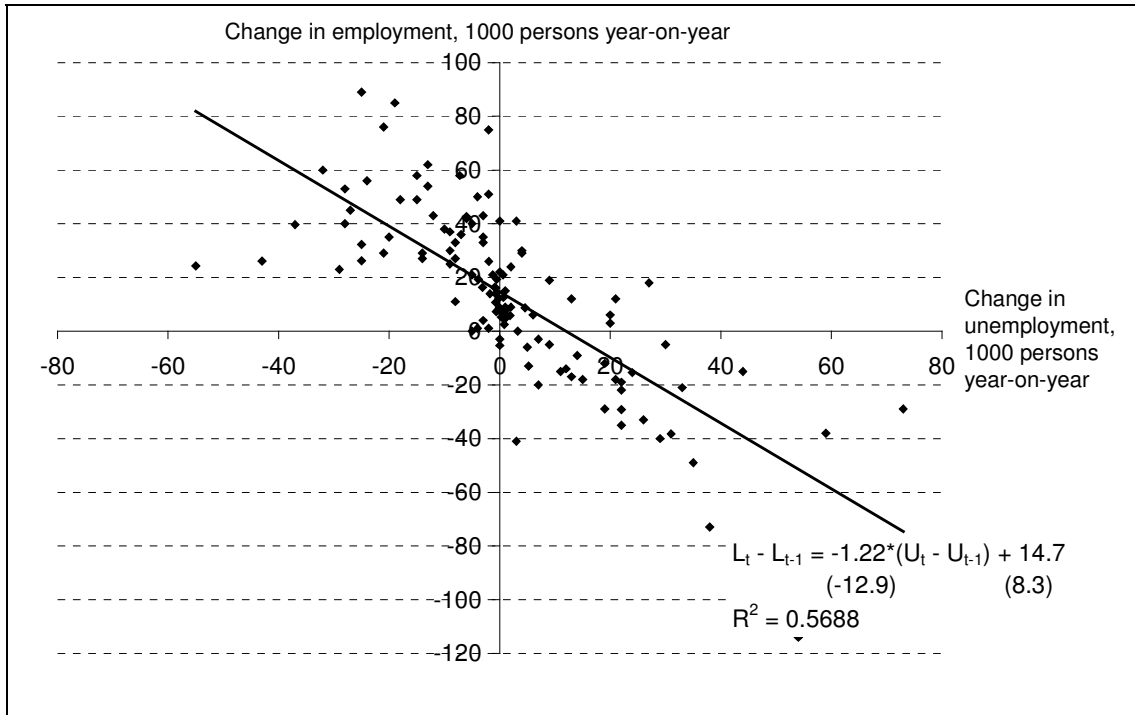
- The total number of employed persons declines thereby reducing the government's tax revenue by an amount corresponding to the implicit tax rate ( $T_t/Y_t$ ) multiplied by the decrease in employment ( $a \cdot (U_t - U_{t-1})$ ) and the level of GDP per employed person ( $Y_t/L_t$ ).
- However, the government's tax revenue increases by an amount corresponding to the implicit tax rate ( $T_t/Y_t$ ) multiplied by the increase in the number of unemployed persons ( $U_t - U_{t-1}$ ) and the level of unemployment benefits ( $UB_t/U_t$ ).
- Finally, the government's expenditures increases by the increase in the number of unemployed persons ( $U_t - U_{t-1}$ ) multiplied by the level of unemployment benefits ( $UB_t/U_t$ ).

As mentioned in section 2 unemployment benefit societies are first included within the general government sector with effect from 1907. However, the calculations made on the basis of equation [1] assumes that the development in unemployment also in the pre-1907 period can be used as a proxy for the cyclical variation of the economy that impact the government budget balance.

The parameter a in equation [1] has been estimated at  $-1.22$  on the basis of a simple linear regression of the annual changes in employment and unemployment in the period 1876-2003, cf. chart 4. Employment thus has to be increased by 1,220 persons in order to reduce the unemployment by 1,000 persons, reflecting a pro-cyclical labour-market participation rate (i.e. better employment opportunities causes more people to enter into the labour force, and vice versa).

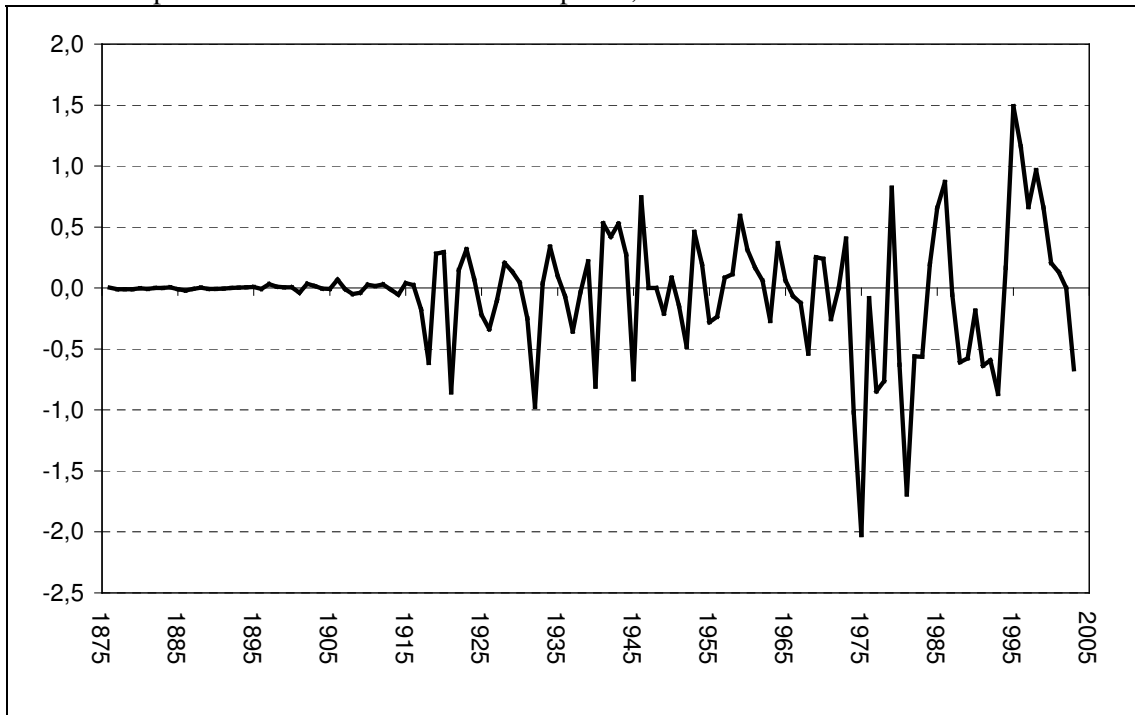
The estimated cyclical impact on the general government budget balance in the period since 1875 measured in per cent of GDP is shown in chart 5. As expected, the cyclical impact has increased over time in step with the increased tax rate and unemployment benefit compensation rate, cf. also chart 6.

Chart 4: Relation between changes in employment and unemployment in Denmark, 1876-2003



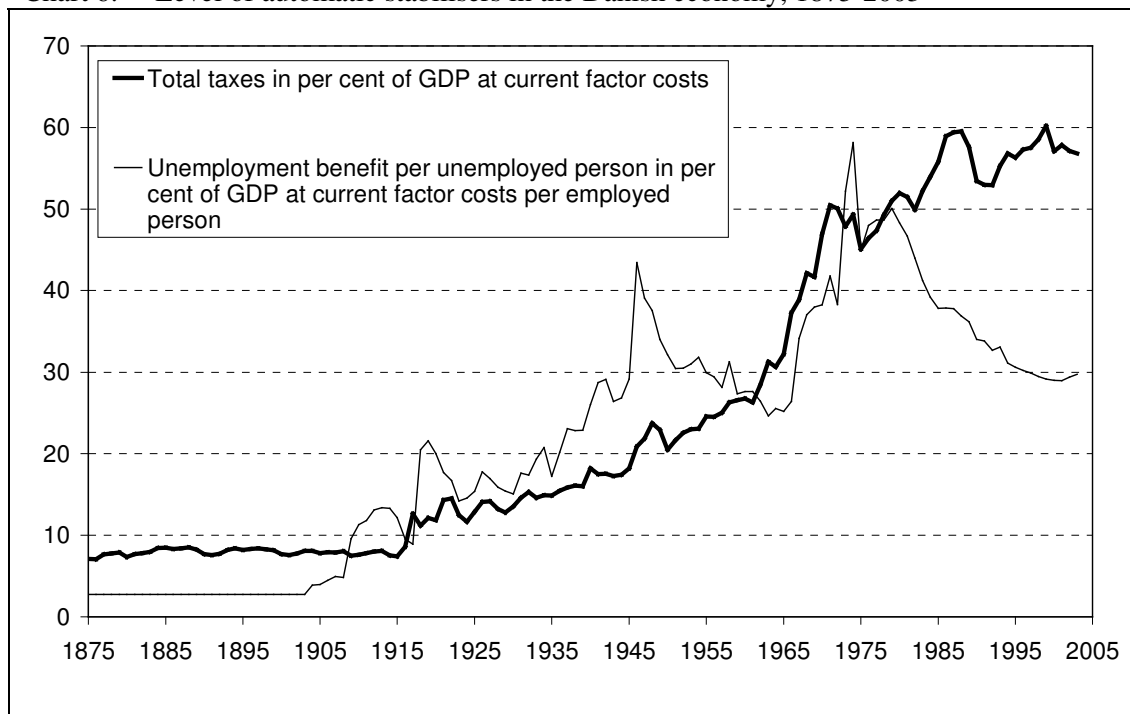
Note: t-values in brackets below the estimated parameters in the regression equation.  
Sources: See appendix 2.

Chart 5: Cyclical impact on the change in the Danish general government budget balance, per cent of GDP at current market prices, 1876-2003



Sources and compilation methods: See text and appendix 2.

Chart 6: Level of automatic stabilisers in the Danish economy, 1875-2003

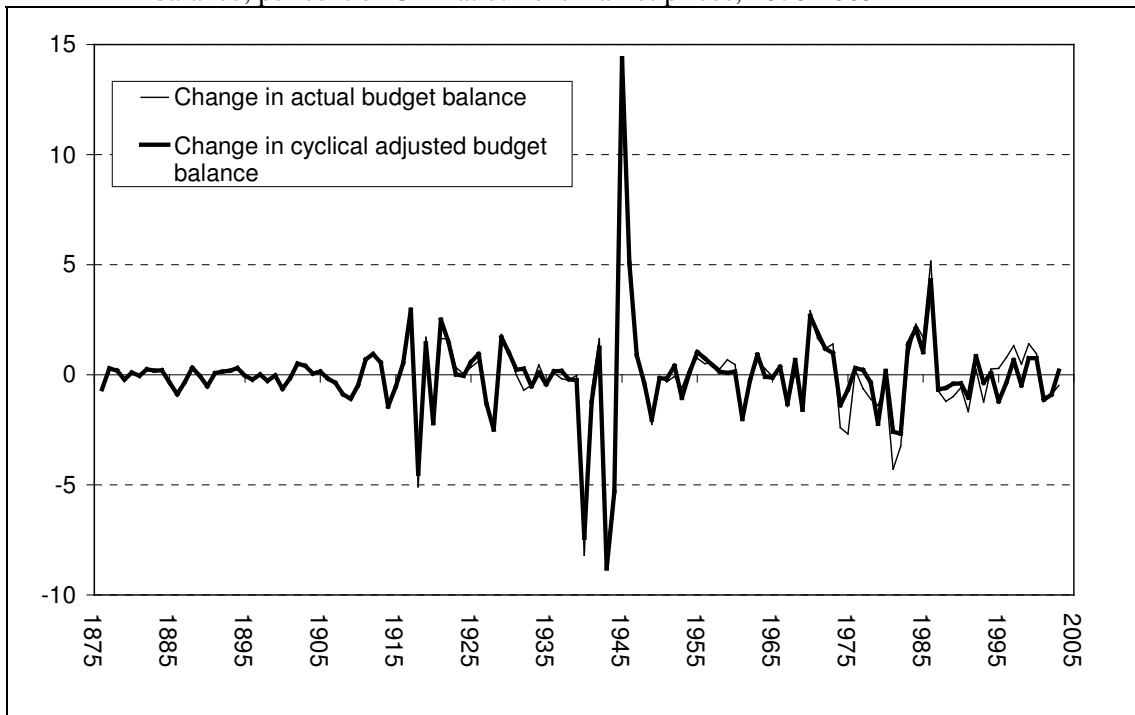


Sources: See appendix 2.

If changes in the actual budget balance are adjusted for cyclical influence one can obtain a measure of the budgetary impact of discretionary fiscal policy changes.<sup>10</sup> When interpreting such figures of cyclically adjusted changes in the budget as a measure of discretionary changes in the stance of the fiscal policy, one should take the following considerations into account:

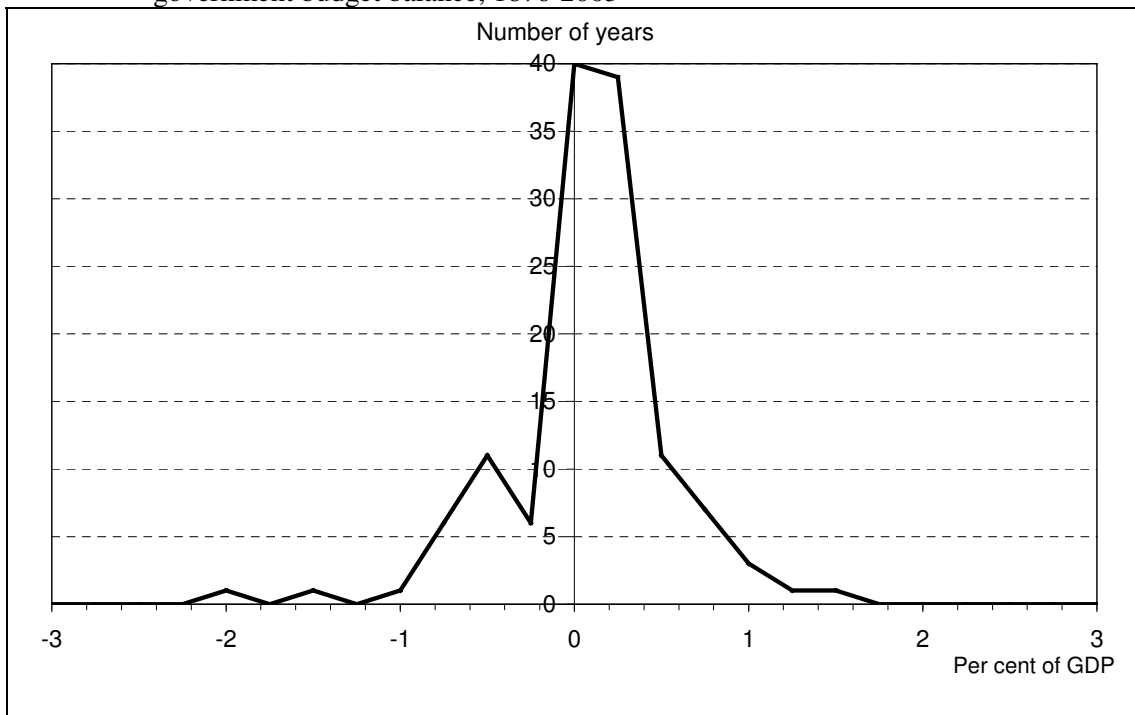
- Any change in the number of unemployed persons gives rise to a cyclical impact on the budget – irrespective of the “nature” of the change in unemployment (i.e. whether it relates to a change in the level of “structural” unemployment or not). This reflects that the fact that any changes in the level of unemployment will automatic have a budget impact due to the government’s unemployment-related expenditures.
- It may be argued that the budget impact of some of the last decades labour-force-reducing measures (such as the early retirement schemes introduced in 1979, the temporary leave schemes introduced in 1994 and the welfare to work programmes also introduced in 1994) ought to be considered as “cyclical” rather than discretionary fiscal policy measures.
- All changes in government net interest payments are treated as non-cyclical. An increase in interest payments due to government borrowing in earlier periods will therefore be considered as an expansive fiscal policy if the increase in interest expenditures is not covered by increased revenue.
- Finally, caution must always be made when long-span data on cyclically adjusted changes in the budget are studied since temporary and extraordinary events (like e.g. the large public expenditures during World War II) influence the figures.

Chart 7: Actual and cyclical adjusted change in the Danish general government budget balance, per cent of GDP at current market prices, 1876-2003



Sources and compilation methods: See text and appendix 2.

Chart 8: Frequency distribution of the cyclical driven annual changes in Danish general government budget balance, 1876-2003



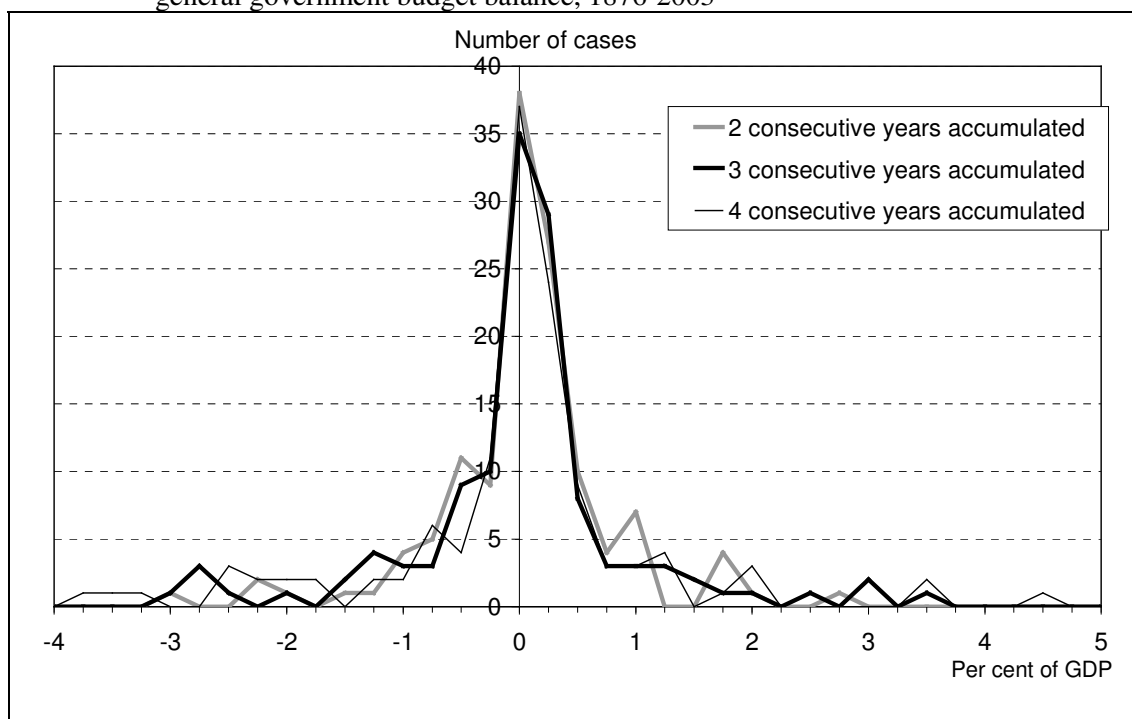
Sources and compilation methods: See text and appendix 2.

<sup>10</sup> The calculations presented in this paper concern only the changes in the cyclically adjusted budget balance – not the absolute level of the cyclically adjusted budget balance.

Chart 7 shows the annual changes in the actual and cyclically adjusted general government budget balance in per cent of GDP in the period 1876-2003. It seems that the cyclical impact on the government budget balance is relatively modest compared to the budgetary impact of discretionary fiscal policy changes.

Chart 8 shows the frequency distribution of the 128 cyclical driven annual changes in Danish general government budget balance in the period since 1876. The largest cyclical deterioration of the general government budget in a single year (in 1975) amounted to around 2 per cent of GDP. If one looks at the accumulated cyclical impact on the budget over 2, 3 or 4 consecutive years, the number of cases where the accumulated negative impact on the budget exceeded more than that 3 per cent of GDP is respectively 1, 1 and 3 during the whole period since 1876, cf. chart 9.

Chart 9: Frequency distribution of the accumulated cyclical driven changes in Danish general government budget balance, 1876-2003



Sources and compilation methods: See text and appendix 2.

## 5. Comparisons with other studies

The calculations presented in section 4 are based on a methodological approach inspired by Christensen (1984, 1993). Topp (1995) has studied the cyclical impact on the general government budget balance 1929-1939, also based on an approach broadly in line Christensen (1993).



This section compares the estimates of the cyclical impact on the general government budget balance presented in section 4 with the results found in Christensen (1993) and Topp (1995). When studying the results of the comparison one needs to take into consideration that the different author's uses somewhat different compilation methodology and data sets. Some of the major differences are the following:

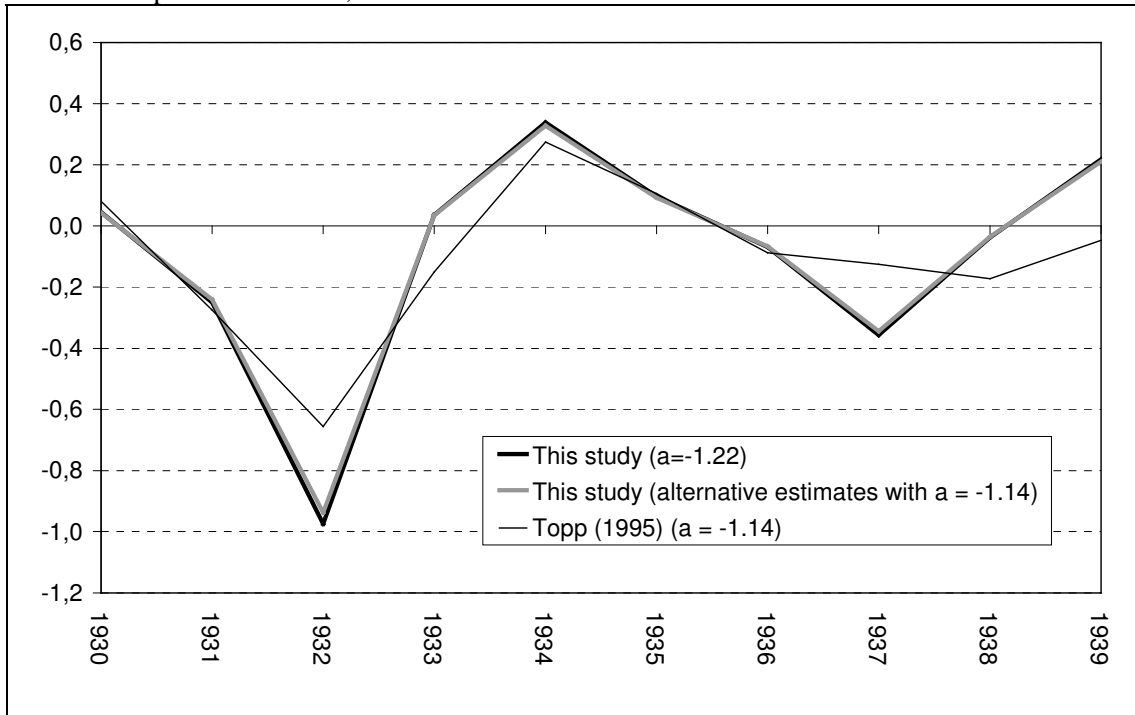
- The parameter (a) represents the change in the number of employed persons (1000 persons) when the number of unemployed persons increases by 1000 persons. In Christensen (1993)  $a = -1.67$  whereas this study uses  $a = -1.22$ . Topp (1995) uses  $a = -1.14$ .
- The estimates of the cyclical impact on the general government budget balance in section 4 are based on total taxes, the total economy GDP, employment and unemployment figures for the total economy and unemployment benefits, cf.  $T_t$ ,  $Y_t$ ,  $L_t$ ,  $U_t$  and  $UB_t$  in equation [1]. The calculations in Christensen (1993) involve the total economy unemployment, the unemployment benefit compensation rate, the private sector wage sum, the personal tax rate, indirect taxes and private demand. Topp (1995) uses the total economy unemployment, the unemployment benefit compensation rate, the total economy wage sum, indirect taxes, private consumption, the direct tax ratio and the total economy GDP.
- The data set in Christensen (1993) includes the Labour market Supplementary Pension Fund (ATP) and the Employees' Wage Indexation Fund (LD) within the general government sector, whereas ATP and LD in the figures presented in section 4 are included in the private sector in line with the current definitions in the official national accounts statistics.

Chart 10 compares the results from section 4 with the cyclical impact on the general government budget balance for the period 1930-1939 with that of Topp (1995). The two different sets of calculations show rather similar results.

Chart 11 compares the results the cyclical impact on the general government budget balance in the period 1960-1990 presented in section 4 with that of Christensen (1993). In general Christensen (1993) finds somewhat larger cyclical impact on the general government budget balance than the study at hand. A large part of the differences compared with the results in section 4 can be explained by different choices of the parameter a.

If one looks at the accumulated cyclical impact on the budget over 1, 2, 3 or 4 consecutive years, the number of cases where the accumulated negative impact on the budget exceeded more than that 3 per cent of GDP is respectively 0, 1, 1 and 3 during the period 1960-1990 based on the data from section 4. The corresponding figures based on Christensen (1993) are respectively 1, 4, 5 and 7.

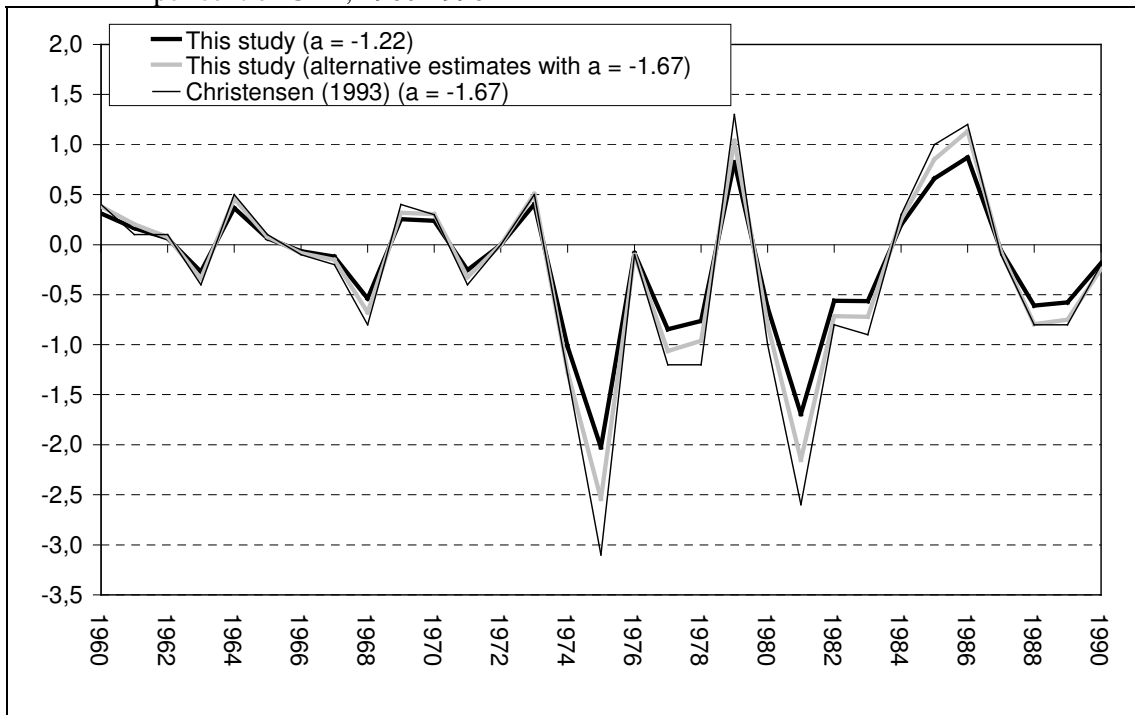
Chart 10: Cyclical impact on the change in the Danish general government budget balance, per cent of GDP, 1930-1939



Note: In order to improve comparability the data from Topp (1995) has been transformed from fiscal-year basis to calendar-year basis.

Sources: Calculations based on Appendix 1 and Topp (1995).

Chart 11: Cyclical impact on the change in the Danish general government budget balance, per cent of GDP, 1960-1990



Sources: Calculations based on appendix 1 and Christensen (1993).

The comparison with the results from Christensen (1993) do not alter the overall conclusion that the cyclical impact on the government budget balance most often seems to be relatively modest compared to that of discretionary fiscal-policy changes. However, the comparisons underline the importance regarding the choice of the parameter ( $\alpha$ ) representing the change in the number of employed persons (1000 persons) when the number of unemployed persons increase by 1000 persons. The results presented in section 4 based on a value of  $\alpha$  equal to  $\alpha = -1.22$  (estimated on the basis of the whole period 1875-2003) may tend to underestimate the cyclical impact on the general government budget balance in the post-1960 period.

The economic literature does not provide any unique and clear-cut operational definition of fiscal sustainability.<sup>11</sup> A 3-per-cent reference value for the general government deficit relative to GDP was laid out in the Maastricht Treaty that came into force on 1 November 1993. This reference value has served as a key benchmark in the monitoring of public finances within EU member states since the start of the second stage of the Economic and Monetary Union (EMU) in 1994. If the government deficit is limited to 3 per cent of GDP and the nominal GDP grows at 5 per cent per annum the steady state debt/GDP ratio will not exceed a 60 per cent limit. Taking into account that the cyclical budget volatility presented in section 4 may be too low in the post-1960 period the results seems to indicate a need for the cyclically adjusted budget balance to be in surplus in periods with strong economic growth if the automatic stabilisers should be allowed to work freely during a cyclical downturn without violating a 3-per-cent budget criteria.

## **6. Summary and scope for further research**

So far projects on compilation of historical national-account statistics for Denmark has not included a split of the total economy into institutional sectors. This paper has attempted to overcome part of this data shortage by the constructing of time series for public and private net lending in the period 1875-2003. However, the accounting principles applied in central and local government accounting statistics has changed over time and the principles are not fully in accordance with the concepts and definitions applied in modern national accounts statistics. This introduces undoubtedly measurement errors, and the figures presented in this paper can only be considered as a first crude attempt to overcome the lack of time series for general government net lending in the existing version of Danish historical national accounts. It would be useful if future projects on historical national-accounts statistics in Denmark would make an attempt to include a full split of the total economy into at least the general government and the private sector.

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<sup>11</sup> Cf. e.g. the survey and discussion in Marinheiro (2004).

The paper has also analysed the long-term term fiscal development in Denmark. Even though Denmark today has one of the largest public sectors in Europe, relatively speaking, the Danish general government's deficit in per cent of GDP has only significantly exceeded 3 per cent of GDP during World War II and in the early 1980s. Furthermore, the cyclical impact on the government budget balance seems most often to be relatively modest compared to that of discretionary fiscal policy changes. However, calculations on the cyclical budget volatility also seem to suggest that the cyclically adjusted budget balance has to be in surplus in periods with strong economic growth if the automatic stabilisers should be allowed to work freely during a cyclical downturn without violating a 3-per-cent budget criteria (the reference value in the Maastricht Treaty).

## 7. References

- Abildgren, K. (2004), A chronology of Denmark's exchange-rate policy 1875-2003, *Danmarks Nationalbank Working Paper*, No. 12, April.
- Andersen, A. B. (2002), Cyclically Adjusted Government Budget Balances, *Danmarks Nationalbank Monetary Review*, 3rd Quarter, 47-58
- Arbejdsdirektoratet (1957), *Arbejdsløshedsforsikringen i Danmark 1932-1957*, Copenhagen: Arbejdsdirektoratet.
- Christensen, A. M. (1984), *Bilag: Beregnede ændringer i finanspolitikken 1967-83*, Annex to Hoffmeyer, E. (1984), *Perspektiver i den danske renteudvikling*, in: BRF (1984), *BRF's jubilæumskonference "Renten" fredag den 2. marts 1984*, Copenhagen: BRF.
- Christensen, A. M. (1993), Finanspolitikken 1960-1990, Appendix 2 in Hoffmeyer, E. (1993), *Pengepolitiske problemstillinger 1965-1990*, Copenhagen: Danmarks Nationalbank, 123-125.
- Christensen, A. M. & Topp, J. (1997), *Monetary policy in Denmark since 1992*, in: Monetary policy in the Nordic countries: Experiences since 1992, *BIS Policy Papers*, No. 2, Basel: BIS, 5-23.
- Christensen, J. P. (1975), *Lønudviklingen inden for dansk håndværk og industri 1870-1914. Bilag*, Copenhagen: Akademisk forlag.
- Christensen, J. P., Hjerpe, R., Krantz, O. & Nielsen, C.-A. (1995), Nordic Historical National Accounts since the 1880s, *Scandinavian Economic History Review*, Vol. XLIII(1), pp. 30-52.
- Cohn, E. (1958), *Privatbanken i København gennem hundrede aar 1857-1957, II. halvbind: Efter arhundredeskiftet*, Copenhagen: Privatbanken i København.
- Danmarks Statistik (1996), Arbejdsløshedsserier 1910-1995, *Statistiske Efterretninger. Arbejdsmarked*, No. 28.
- Hansen, H. C. (1974), *Historien om sygekasserne*, Aalborg: De samvirkende centralforeninger af sygekasser i Danmark.
- Hansen, N. L. & Knudsen, D. (1999), Measurement of Fiscal Policy, *Danmarks Nationalbank Monetary Review*, 4th Quarter, 37-52.
- Hansen, S. Aa. (1983), *Økonomisk vækst i Danmark. Bind II: 1914-1983*, Third Edition, Copenhagen: Akademisk Forlag.
- Hansen, S. Aa. & Henriksen, I. (1984), *Sociale brydninger 1914-1939*, bind 6 i Dansk socialhistorie, Second Edition, Copenhagen: Gyldendal.
- Hyltdoft, O. (1993), Danske historiske nationalindkomstberegninger, *Nationaløkonomisk tidsskrift*, Vol 131, pp. 344-353.

- Hyltoft, O. (1994), Uløste problemer i danske historiske nationalregnskaber, *Nationaløkonomisk tidsskrift*, Vol 132, pp. 92-102.
- Johansen, H. C. (1985), *Danish historical statistics 1814-1980*, Copenhagen: Gyldendal.
- Kærgård, N. (1991), *Økonomisk vækst. En økonometrisk analyse af Danmark 1870-1981*, Copenhagen: Jurist- og Økonomforbundets Forlag.
- Marinho, C. F. (2004). *Sustainability of Portuguese Fiscal Policy in Historical Perspective*, mimeo, University de Coimbra, December.
- Mogensen, G. V. (1987), *Historie og økonomi*, Copenhagen: Akademisk Forlag.
- Nielsen, C.-A. (2004), LAMEJSLA. Nye serier for landbrug og landbrugsindustri i de danske historiske nationalregnskaber 1900-1947, *Historisk Tidsskrift*, Vol. 104, pp. 229-241.
- Norstrand, R. (1977), Høj eller lav vækst i det offentlige forbrug?, *Juristen & Økonomen*, Vol. 59, 149-157.
- OECD (2004), *Economic Outlook*, No. 76, OECD: Paris.
- Pedersen, P. J. (1977), Arbejdsstyrke og beskæftigelse 1911-70, *Socialt Tidsskrift*, Vol. 53(2), 31-56.
- Rasmussen, P. N. (1972), Den offentlige sektor gennem 100 år, *Nationaløkonomisk tidsskrift*, Vol. 110, 332-378.
- Schmidt-Sørensen, J. B. (1985), Arbejdstidsforkortelse i historisk perspektiv, *Økonomi & Politik* 1985, Vol. 59(1), 2-11.
- Schuknecht, L. & Tanzi, V. (2000), *Public Spending in the 20th Century*, New York: Cambridge University Press.
- Skaarup, M. (2005), A bottom-up approach to assess the budgetary impact of discretionary fiscal policies, *Finansministeriet Working paper*, No. 15.
- Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website ([www.dst.dk](http://www.dst.dk)).
- Statistics Denmark, *Statistical ten-year review*, various issues.
- Statistics Denmark, *Statistical Yearbook*, various issues.
- Statistics Denmark (2001), *50-year review*, 2nd Edition, Copenhagen: Statistics Denmark.
- Topp, N.-H. (1995), Influence of Public Sector on Activity in Denmark 1929-39, *Scandinavian Economic History Review*, Vol. XLIII, pp. 339-356.
- Topp, N.-H. (1997), Unemployment in Denmark in the 1930s, *Scandinavian Economic History Review*, Vol. XLV, pp. 131-141.
- Vater, Aa. (ed.) (1932), *Arbejdsløshedslovgivningen i Danmark gennem 25 aar 1907-1932*, Copenhagen.
- Warming, J. (1913), *Haandbog i Danmarks Statistik*, Copenhagen: GADs Forlag.

## Appendix 1: Data

Table A.1: Danish general government net lending, current prices, 1875-2003

Year	million kroner	per cent of GDP at market prices	Year	million kroner	per cent of GDP at market prices
1875	2.6	0.3	1945	-530.3	-3.7
1876	-3.1	-0.4	1946	376.3	2.4
1877	-0.8	-0.1	1947	529.6	3.1
1878	0.6	0.1	1948	454.1	2.4
1879	-1.2	-0.1	1949	-1.8	0.0
1880	-0.3	0.0	1950	-18.3	-0.1
1881	-0.8	-0.1	1951	-100.2	-0.4
1882	1.4	0.2	1952	-118.7	-0.4
1883	3.1	0.3	1953	-289.3	-1.0
1884	4.9	0.6	1954	-199.1	-0.7
1885	1.8	0.2	1955	37.9	0.1
1886	-5.9	-0.7	1956	208.6	0.6
1887	-9.0	-1.1	1957	396.1	1.1
1888	-6.2	-0.7	1958	488.8	1.3
1889	-6.8	-0.7	1959	769.5	1.9
1890	-12.1	-1.2	1960	974.7	2.2
1891	-11.5	-1.1	1961	64.5	0.1
1892	-10.0	-1.0	1962	-41.7	-0.1
1893	-8.0	-0.8	1963	335.8	0.6
1894	-4.9	-0.5	1964	522.9	0.8
1895	-5.4	-0.5	1965	465.9	0.6
1896	-7.9	-0.7	1966	695.2	0.9
1897	-7.5	-0.7	1967	-554.7	-0.6
1898	-10.8	-0.9	1968	-434.6	-0.4
1899	-11.1	-0.9	1969	-1907.8	-1.7
1900	-19.6	-1.4	1970	1648.0	1.3
1901	-22.3	-1.6	1971	3899.3	2.9
1902	-14.4	-1.0	1972	5740.0	3.7
1903	-8.0	-0.5	1973	8222.8	4.6
1904	-7.3	-0.5	1974	3428.3	1.7
1905	-5.1	-0.3	1975	-2587.3	-1.2
1906	-6.9	-0.4	1976	-2011	-0.8
1907	-13.5	-0.8	1977	-3816	-1.3
1908	-30.9	-1.7	1978	-7382	-2.3
1909	-52.0	-2.8	1979	-12385	-3.5
1910	-61.0	-3.1	1980	-14107	-3.7
1911	-45.9	-2.2	1981	-32214	-7.6
1912	-24.2	-1.1	1982	-47844	-9.9
1913	-11.3	-0.5	1983	-43396	-8.2
1914	-50.2	-1.9	1984	-29994	-5.1
1915	-65.1	-2.2	1985	-19239	-3.0
1916	-43.8	-1.1	1986	16166	2.4
1917	68.1	1.7	1987	10924	1.5
1918	-170.2	-3.6	1988	1886	0.3
1919	-73.2	-1.3	1989	-5940	-0.8
1920	-212.7	-2.9	1990	-10762	-1.3
1921	-111.1	-1.8	1991	-25417	-2.9
1922	-20.2	-0.4	1992	-23184	-2.6
1923	0.3	0.0	1993	-34453	-3.8
1924	1.6	0.0	1994	-32006	-3.3
1925	24.3	0.4	1995	-29081	-2.9
1926	59.2	1.0	1996	-20610	-1.9
1927	-18.5	-0.3	1997	-5680	-0.5
1928	-148.7	-2.6	1998	-146	0.0
1929	-37.0	-0.6	1999	16979	1.4
1930	26.8	0.4	2000	29358	2.3
1931	26.0	0.5	2001	15876	1.2
1932	-11.8	-0.2	2002	3580	0.3
1933	-40.4	-0.7	2003	-3176	-0.2
1934	-12.5	-0.2			
1935	-35.4	-0.5			
1936	-29.6	-0.4			
1937	-43.6	-0.6			
1938	-63.2	-0.8			
1939	-66.1	-0.8			
1940	-808.9	-8.9			
1941	-882.0	-8.6			
1942	-694.5	-6.1			
1943	-1764.9	-13.6			
1944	-2491.4	-17.3			

Table A.2: Danish GDP, current prices, million kroner, 1875-2003

Year	GDP at factor costs			Indirect taxes net of subsidies	GDP at market prices
	General government	Private sector	Total economy		
1875	37	772	808	27	835
1876	40	792	832	26	858
1877	39	734	773	25	798
1878	38	720	758	24	782
1879	40	719	759	26	785
1880	40	800	840	26	866
1881	39	800	839	28	867
1882	42	808	850	29	879
1883	42	826	868	30	898
1884	44	795	839	30	869
1885	46	774	820	30	850
1886	49	770	819	29	848
1887	53	774	827	30	857
1888	53	788	841	32	873
1889	55	837	892	32	924
1890	58	907	965	32	997
1891	56	952	1008	33	1041
1892	58	947	1005	32	1037
1893	58	942	1000	34	1034
1894	57	933	990	34	1024
1895	54	985	1039	37	1076
1896	58	1001	1059	38	1097
1897	58	1039	1097	42	1139
1898	59	1098	1157	45	1202
1899	63	1154	1217	47	1264
1900	68	1254	1322	46	1368
1901	69	1303	1372	47	1419
1902	70	1326	1396	49	1445
1903	72	1390	1462	51	1513
1904	76	1403	1479	52	1531
1905	74	1484	1558	53	1611
1906	80	1547	1627	60	1687
1907	84	1655	1739	62	1801
1908	94	1679	1773	64	1837
1909	105	1723	1828	51	1879
1910	100	1822	1922	54	1976
1911	105	1946	2051	57	2108
1912	104	2055	2159	64	2223
1913	108	2193	2301	67	2368
1914	144	2385	2529	64	2593
1915	172	2715	2887	75	2962
1916	222	3545	3767	89	3856
1917	268	3735	4003	41	4044
1918	357	4409	4766	-91	4675
1919	360	5461	5821	-120	5701
1920	409	6987	7396	-56	7340
1921	376	5681	6057	147	6204
1922	428	4978	5406	208	5614
1923	392	5638	6030	245	6275
1924	371	6195	6566	248	6814
1925	405	5748	6153	239	6392
1926	441	5088	5529	236	5765
1927	391	4927	5318	250	5568
1928	367	5070	5437	258	5695
1929	367	5435	5802	285	6087
1930	352	5353	5705	295	6000
1931	359	5010	5369	296	5665
1932	355	4757	5112	272	5384
1933	365	5141	5506	323	5829
1934	378	5589	5967	361	6328
1935	411	5969	6380	354	6734
1936	429	6261	6690	390	7080
1937	456	6685	7141	418	7559
1938	488	7026	7514	422	7936
1939	527	7600	8127	450	8577
1940	...	...	8620	428	9048
1941	...	...	9790	417	10207
1942	...	...	11020	446	11466
1943	...	...	12480	458	12938
1944	...	...	13850	587	14437

Table A.2 (continued): Danish GDP, current prices, million kroner, 1875-2003

Year	GDP at factor costs			Indirect taxes net of subsidies	GDP at market prices
	General government	Private sector	Total economy		
1945	...	...	13960	430	14390
1946	...	...	14770	856	15626
1947	1234	15040	16274	1018	17292
1948	1400	16262	17662	1181	18843
1949	1404	17491	18895	1306	20201
1950	1578	20040	21618	1514	23132
1951	1817	21586	23403	1647	25050
1952	2031	22954	24985	1705	26690
1953	2242	24294	26536	2014	28550
1954	2456	25162	27618	2273	29891
1955	2616	26091	28707	2563	31270
1956	2877	27766	30643	2760	33403
1957	3053	29615	32668	2876	35544
1958	3347	30634	33981	3169	37150
1959	3575	33860	37435	3643	41078
1960	3818	36705	40523	3907	44430
1961	4824	40551	45375	4000	49375
1962	5743	45025	50768	4918	55686
1963	6143	47333	53476	5709	59185
1964	7120	53951	61071	6625	67696
1965	8547	59744	68291	7774	76065
1966	9963	58897	68860	10025	78885
1967	11515	63847	75362	11532	86894
1968	13317	69794	83111	13714	96825
1969	15087	79576	94663	15723	110386
1970	19378	85272	104650	17493	122143
1971	21883	93918	115801	19453	135254
1972	25218	107997	133215	22108	155323
1973	29432	124716	154148	24007	178155
1974	35639	139741	175380	24276	199656
1975	42801	152737	195538	27843	223381
1976	49289	176533	225822	33411	259233
1977	53862	194668	248530	39427	287957
1978	61001	213500	274501	46563	321064
1979	69486	232939	302425	54888	357313
1980	78745	248799	327544	58264	385808
1981	90804	268362	359166	63237	422403
1982	106017	308511	414528	67683	482211
1983	114572	341827	456399	75328	531727
1984	119216	379938	499154	84392	583546
1985	125740	413515	539255	94763	634018
1986	129981	443958	573939	111627	685566
1987	142241	463937	606178	114765	720943
1988	153871	479882	633753	114521	748274
1989	160600	514447	675047	113553	788600
1990	165571	562094	727665	112983	840648
1991	172415	586291	758706	115657	874363
1992	179116	614168	793284	113311	906595
1993	183833	611266	795099	116710	911809
1994	190708	657142	847850	129095	976945
1995	196739	687498	884237	135308	1019545
1996	206808	716694	923502	145986	1069488
1997	215584	750955	966539	159102	1125641
1998	227567	761245	988812	174804	1163616
1999	237047	795833	1032880	180593	1213473
2000	246582	864846	1111428	182536	1293964
2001	258426	886011	1144437	191174	1335611
2002	269175	895473	1164648	197761	1362409
2003	279138	920988	1200126	201682	1401808



Table A.3: Total taxes to the Danish general government, current prices, million kroner, 1875-2003

Year	Total taxes	Year	Total taxes
1875	57	1945	2544
1876	59	1946	3084
1877	59	1947	3553
1878	59	1948	4195
1879	60	1949	4330
1880	62	1950	4430
1881	64	1951	5071
1882	67	1952	5637
1883	69	1953	6093
1884	71	1954	6371
1885	70	1955	7045
1886	68	1956	7513
1887	70	1957	8169
1888	72	1958	8939
1889	74	1959	9942
1890	74	1960	10852
1891	76	1961	11925
1892	78	1962	14443
1893	82	1963	16729
1894	83	1964	18726
1895	85	1965	22003
1896	88	1966	25652
1897	92	1967	29323
1898	96	1968	35000
1899	99	1969	39434
1900	102	1970	49105
1901	104	1971	58454
1902	109	1972	66685
1903	118	1973	73764
1904	120	1974	86488
1905	122	1975	88153
1906	129	1976	104853
1907	137	1977	117661
1908	142	1978	135226
1909	137	1979	154273
1910	146	1980	170141
1911	160	1981	184935
1912	173	1982	206846
1913	186	1983	238231
1914	191	1984	269210
1915	214	1985	300930
1916	323	1986	338149
1917	505	1987	360056
1918	532	1988	377250
1919	704	1989	388719
1920	875	1990	388942
1921	866	1991	401831
1922	785	1992	419882
1923	752	1993	439382
1924	765	1994	481521
1925	791	1995	497905
1926	778	1996	529179
1927	752	1997	555911
1928	718	1998	579021
1929	741	1999	621609
1930	772	2000	634609
1931	784	2001	661699
1932	783	2002	665287
1933	804	2003	681645
1934	889		
1935	950		
1936	1033		
1937	1133		
1938	1208		
1939	1300		
1940	1570		
1941	1711		
1942	1931		
1943	2154		
1944	2413		

Table A.4: Unemployment benefits in Denmark, current prices, million kroner, 1875-2003

Year	Unemployment benefits	Year	Unemployment benefits				
1875	0.2	1945	176.6				
1876	0.2	1946	189.0				
1877	0.2	1947	187.7				
1878	0.3	1948	193.8				
1879	0.3	1949	212.9				
1880	0.3	1950	212.3				
1881	0.3	1951	240.5				
1882	0.3	1952	337.9				
1883	0.3	1953	282.2				
1884	0.3	1954	262.1				
1885	0.3	1955	308.3				
1886	0.4	1956	370.4				
1887	0.4	1957	360.8				
1888	0.4	1958	393.3				
1889	0.4	1959	243.6				
1890	0.5	1960	188.3				
1891	0.5	1961	165.8				
1892	0.5	1962	158.1				
1893	0.5	1963	226				
1894	0.4	1964	147				
1895	0.4	1965	139				
1896	0.5	1966	172				
1897	0.4	1967	297				
1898	0.4	1968	619				
1899	0.4	1969	566				
1900	0.4	1970	480				
1901	0.5	1971	756				
1902	0.4	1972	784				
1903	0.4	1973	784				
1904	0.6	1974	2325				
1905	0.7	1975	4573				
1906	0.4	1976	5682				
1907	0.5	1977	7774				
1908	0.8	1978	9930				
1909	2.1	1979	9460				
1910	2.3	1980	11319				
1911	2.3	1981	16078				
1912	2.3	1982	18863				
1913	2.7	1983	20952				
1914	3.8	1984	20940				
1915	3.2	1985	19509				
1916	2.7	1986	17740				
1917	5.4	1987	18792				
1918	33.7	1988	21270				
1919	31.4	1989	24290				
1920	22.4	1990	25453				
1921	45.1	1991	28872				
1922	32.9	1992	31706				
1923	19.6	1993	35819				
1924	18.7	1994	34720				
1925	26.0	1995	29648				
1926	38.1	1996	25741				
1927	38.0	1997	23660				
1928	29.1	1998	19547				
1929	25.1	1999	17284				
1930	22.3	2000	17490				
1931	32.3	2001	17254				
1932	59.6	2002	17854				
1933	68.2	2003	22225				
1934	63.4						
1935	51.6						
1936	65.2						
1937	96.2						
1938	100.6						
1939	95.6						
1940	163.2						
1941	161.4						
1942	150.2						
1943	109.0						
1944	97.0						

Table A.5: The Danish labour market, 1875-2003

Year	Labour force	Employment	Unemployment	Unemployment rate
		1000 persons		per cent
1875	1081	1069	12	1.1
1876	1088	1077	11	1.0
1877	1098	1086	12	1.1
1878	1105	1092	13	1.2
1879	1112	1097	14	1.3
1880	1117	1103	15	1.3
1881	1123	1107	15	1.4
1882	1130	1115	15	1.4
1883	1138	1122	16	1.4
1884	1145	1130	15	1.3
1885	1150	1134	16	1.4
1886	1158	1140	18	1.5
1887	1163	1145	19	1.6
1888	1171	1153	19	1.6
1889	1179	1160	19	1.6
1890	1182	1162	20	1.7
1891	1190	1169	21	1.7
1892	1199	1178	21	1.7
1893	1211	1190	20	1.7
1894	1230	1210	20	1.6
1895	1239	1220	19	1.5
1896	1253	1233	20	1.6
1897	1266	1249	17	1.3
1898	1281	1266	16	1.2
1899	1297	1282	15	1.2
1900	1310	1296	14	1.1
1901	1323	1304	19	1.4
1902	1339	1324	15	1.1
1903	1351	1338	13	1.0
1904	1372	1359	14	1.0
1905	1379	1365	15	1.1
1906	1430	1423	8	0.5
1907	1439	1431	9	0.6
1908	1432	1418	14	1.0
1909	1435	1418	17	1.2
1910	1459	1444	15	1.0
1911	1479	1465	14	0.9
1912	1478	1466	12	0.8
1913	1494	1481	13	0.9
1914	1528	1511	17	1.1
1915	1529	1515	14	0.9
1916	1602	1590	12	0.7
1917	1600	1576	24	1.5
1918	1589	1536	53	3.3
1919	1638	1598	40	2.4
1920	1681	1656	25	1.5
1921	1710	1641	69	4.0
1922	1735	1674	61	3.5
1923	1790	1750	40	2.2
1924	1825	1790	35	1.9
1925	1830	1781	49	2.7
1926	1820	1752	68	3.7
1927	1832	1758	74	4.0
1928	1873	1812	61	3.3
1929	1901	1849	52	2.7
1930	1941	1892	49	2.5
1931	1938	1874	64	3.3
1932	1878	1760	118	6.3
1933	1927	1811	116	6.0
1934	1993	1896	97	4.9
1935	2029	1938	91	4.5
1936	2062	1967	95	4.6
1937	2069	1955	114	5.5
1938	2095	1979	116	5.5
1939	2126	2022	104	4.9
1940	2091	1949	142	6.8
1941	2155	2038	117	5.4
1942	2170	2073	97	4.5
1943	2188	2118	70	3.2
1944	2203	2147	56	2.5

Table A.5 (continued): The Danish labour market, 1875-2003

Year	Labour force	Employment	Unemployment	Unemployment rate
	1000 persons			per cent
1945	2189	2098	91	4.2
1946	2201	2138	63	2.9
1947	2198	2135	63	2.9
1948	2220	2157	63	2.8
1949	2248	2176	72	3.2
1950	2294	2226	68	3.0
1951	2298	2223	75	3.3
1952	2285	2188	97	4.2
1953	2293	2217	76	3.3
1954	2314	2247	67	2.9
1955	2310	2230	80	3.5
1956	2306	2215	91	3.9
1957	2303	2216	87	3.8
1958	2298	2216	82	3.6
1959	2323	2269	54	2.3
1960	2357	2318	39	1.7
1961	2376	2345	31	1.3
1962	2406	2378	28	1.2
1963	2431	2390	41	1.7
1964	2462	2439	23	0.9
1965	2494	2474	20	0.8
1966	2456	2433	23	0.9
1967	2455	2427	28	1.1
1968	2488	2439	49	2.0
1969	2516	2477	39	1.6
1970	2532	2502	30	1.2
1971	2536	2497	39	1.5
1972	2577	2538	39	1.5
1973	2590	2565	25	1.0
1974	2602	2544	58	2.2
1975	2646	2515	131	5.0
1976	2690	2556	134	5.0
1977	2715	2551	164	6.0
1978	2760	2569	191	6.9
1979	2754	2592	162	5.9
1980	2757	2573	184	6.7
1981	2778	2535	243	8.7
1982	2804	2541	263	9.4
1983	2827	2544	283	10.0
1984	2856	2580	276	9.7
1985	2888	2636	252	8.7
1986	2916	2696	220	7.5
1987	2927	2705	222	7.6
1988	2927	2683	244	8.3
1989	2930	2665	265	9.0
1990	2917	2645	272	9.3
1991	2925	2629	296	10.1
1992	2918	2600	318	10.9
1993	2911	2562	349	12.0
1994	2947	2604	343	11.6
1995	2917	2629	288	9.9
1996	2900	2655	245	8.4
1997	2907	2687	220	7.6
1998	2910	2727	183	6.3
1999	2911	2753	158	5.4
2000	2914	2764	150	5.1
2001	2930	2785	145	4.9
2002	2925	2780	145	5.0
2003	2918	2747	171	5.9

Table A.6: Cyclical impact on the annual change in the Danish general government net lending, 1876-2003

Year	Annual change in the general government net lending	Cyclical impact on the annual change in the general government net lending	Cyclical adjusted annual change in the general government net lending	Annual change in the general government net lending	Cyclical impact on the annual change in the general government net lending	Cyclical adjusted annual change in the general government net lending
	million kroner			per cent of GDP at market prices		
1876	-5.6	0.0	-5.6	-0.7	0.0	-0.7
1877	2.3	-0.1	2.4	0.3	0.0	0.3
1878	1.4	-0.1	1.5	0.2	0.0	0.2
1879	-1.8	-0.1	-1.7	-0.2	0.0	-0.2
1880	0.9	0.0	0.9	0.1	0.0	0.1
1881	-0.5	-0.1	-0.4	-0.1	0.0	0.0
1882	2.2	0.0	2.2	0.2	0.0	0.2
1883	1.7	0.0	1.7	0.2	0.0	0.2
1884	1.8	0.1	1.7	0.2	0.0	0.2
1885	-3.1	-0.1	-3.0	-0.4	0.0	-0.4
1886	-7.7	-0.2	-7.5	-0.9	0.0	-0.9
1887	-3.1	-0.1	-3.0	-0.4	0.0	-0.4
1888	2.8	0.0	2.8	0.3	0.0	0.3
1889	-0.6	-0.1	-0.5	-0.1	0.0	-0.1
1890	-5.2	-0.1	-5.1	-0.5	0.0	-0.5
1891	0.6	-0.1	0.6	0.1	0.0	0.1
1892	1.5	0.0	1.5	0.1	0.0	0.1
1893	2.0	0.0	1.9	0.2	0.0	0.2
1894	3.2	0.1	3.1	0.3	0.0	0.3
1895	-0.5	0.1	-0.6	0.0	0.0	-0.1
1896	-2.5	-0.1	-2.5	-0.2	0.0	-0.2
1897	0.4	0.4	0.1	0.0	0.0	0.0
1898	-3.3	0.1	-3.4	-0.3	0.0	-0.3
1899	-0.3	0.1	-0.4	0.0	0.0	0.0
1900	-8.6	0.1	-8.6	-0.6	0.0	-0.6
1901	-2.6	-0.6	-2.1	-0.2	0.0	-0.1
1902	7.8	0.5	7.4	0.5	0.0	0.5
1903	6.4	0.2	6.2	0.4	0.0	0.4
1904	0.8	-0.1	0.9	0.1	0.0	0.1
1905	2.2	-0.1	2.3	0.1	0.0	0.1
1906	-1.8	1.1	-2.9	-0.1	0.1	-0.2
1907	-6.7	-0.2	-6.5	-0.4	0.0	-0.4
1908	-17.4	-0.9	-16.4	-0.9	-0.1	-0.9
1909	-21.1	-0.8	-20.4	-1.1	0.0	-1.1
1910	-9.0	0.5	-9.5	-0.5	0.0	-0.5
1911	15.1	0.4	14.7	0.7	0.0	0.7
1912	21.7	0.6	21.0	1.0	0.0	0.9
1913	12.9	-0.3	13.2	0.5	0.0	0.6
1914	-38.9	-1.4	-37.4	-1.5	-0.1	-1.4
1915	-14.9	1.2	-16.1	-0.5	0.0	-0.5
1916	21.3	0.9	20.4	0.6	0.0	0.5
1917	111.9	-7.1	118.9	2.8	-0.2	2.9
1918	-238.3	-28.6	-209.7	-5.1	-0.6	-4.5
1919	97.0	16.0	81.0	1.7	0.3	1.4
1920	-139.5	21.5	-161.0	-1.9	0.3	-2.2
1921	101.6	-53.0	154.7	1.6	-0.9	2.5
1922	90.9	8.3	82.6	1.6	0.1	1.5
1923	20.5	20.0	0.5	0.3	0.3	0.0
1924	1.3	5.0	-3.7	0.0	0.1	-0.1
1925	22.7	-14.1	36.8	0.4	-0.2	0.6
1926	34.9	-19.5	54.3	0.6	-0.3	0.9
1927	-77.7	-5.8	-71.9	-1.4	-0.1	-1.3
1928	-130.2	11.7	-141.8	-2.3	0.2	-2.5
1929	111.7	8.2	103.5	1.8	0.1	1.7
1930	63.8	2.7	61.1	1.1	0.0	1.0
1931	-0.8	-14.1	13.3	0.0	-0.2	0.2
1932	-37.8	-52.4	14.7	-0.7	-1.0	0.3
1933	-28.6	2.1	-30.7	-0.5	0.0	-0.5
1934	27.9	21.5	6.4	0.4	0.3	0.1
1935	-23.0	6.5	-29.5	-0.3	0.1	-0.4
1936	5.8	-4.9	10.7	0.1	-0.1	0.2
1937	-13.9	-26.9	13.0	-0.2	-0.4	0.2
1938	-19.7	-2.9	-16.7	-0.2	0.0	-0.2
1939	-2.9	18.7	-21.6	0.0	0.2	-0.3
1940	-742.8	-73.1	-669.7	-8.2	-0.8	-7.4
1941	-73.0	54.1	-127.1	-0.7	0.5	-1.2
1942	187.4	48.3	139.1	1.6	0.4	1.2
1943	-1070.4	68.3	-1138.7	-8.3	0.5	-8.8
1944	-726.4	39.2	-765.7	-5.0	0.3	-5.3
1945	1961.1	-107.4	2068.5	13.6	-0.7	14.4

Table A.6 (continued): Cyclical impact on the annual change in the Danish general government net lending, 1876-2003

Year	Annual change in the general government net lending	Cyclical impact on the annual change in the general government net lending	Cyclical adjusted annual change in the general government net lending	Annual change in the general government net lending	Cyclical impact on the annual change in the general government net lending	Cyclical adjusted annual change in the general government net lending
	million kroner			per cent of GDP at market prices		
1946	906,6	115,8	790,8	5,8	0,7	5,1
1947	153,3	0,0	153,3	0,9	0,0	0,9
1948	-75,6	0,0	-75,6	-0,4	0,0	-0,4
1949	-455,8	-42,4	-413,4	-2,3	-0,2	-2,0
1950	-16,6	19,7	-36,2	-0,1	0,1	-0,2
1951	-81,8	-37,1	-44,7	-0,3	-0,1	-0,2
1952	-18,5	-128,6	110,1	-0,1	-0,5	0,4
1953	-170,6	130,6	-301,2	-0,6	0,5	-1,1
1954	90,2	58,3	31,9	0,3	0,2	0,1
1955	236,9	-88,0	324,9	0,8	-0,3	1,0
1956	170,7	-79,4	250,1	0,5	-0,2	0,7
1957	187,5	30,5	157,0	0,5	0,1	0,4
1958	92,8	42,3	50,4	0,2	0,1	0,1
1959	280,7	242,7	38,0	0,7	0,6	0,1
1960	205,2	138,8	66,4	0,5	0,3	0,1
1961	-910,2	81,3	-991,5	-1,8	0,2	-2,0
1962	-106,2	34,4	-140,6	-0,2	0,1	-0,3
1963	377,4	-160,4	537,8	0,6	-0,3	0,9
1964	187,1	248,6	-61,5	0,3	0,4	-0,1
1965	-57,0	46,7	-103,7	-0,1	0,1	-0,1
1966	229,3	-52,7	282,0	0,3	-0,1	0,4
1967	-1249,9	-106,2	-1143,7	-1,4	-0,1	-1,3
1968	120,2	-521,8	642,0	0,1	-0,5	0,7
1969	-1473,2	279,2	-1752,4	-1,3	0,3	-1,6
1970	3555,8	292,3	3263,5	2,9	0,2	2,7
1971	2251,3	-343,9	2595,1	1,7	-0,3	1,9
1972	1840,8	0,0	1840,8	1,2	0,0	1,2
1973	2482,8	720,9	1761,8	1,4	0,4	1,0
1974	-4794,5	-2041,4	-2753,1	-2,4	-1,0	-1,4
1975	-6015,5	-4526,2	-1489,3	-2,7	-2,0	-0,7
1976	576,3	-218,5	794,8	0,2	-0,1	0,3
1977	-1805,0	-2439,7	634,7	-0,6	-0,8	0,2
1978	-3566,0	-2448,9	-1117,1	-1,1	-0,8	-0,3
1979	-5003,0	2938,8	-7941,8	-1,4	0,8	-2,2
1980	-1722,0	-2428,1	706,1	-0,4	-0,6	0,2
1981	-18107,0	-7153,4	-10953,6	-4,3	-1,7	-2,6
1982	-15630,0	-2708,2	-12921,8	-3,2	-0,6	-2,7
1983	4448,0	-2996,5	7444,5	0,8	-0,6	1,4
1984	13402,0	1137,2	12264,8	2,3	0,2	2,1
1985	10755,0	4169,3	6585,7	1,7	0,7	1,0
1986	35405,0	5964,7	29440,3	5,2	0,9	4,3
1987	-5242,0	-394,1	-4847,9	-0,7	-0,1	-0,7
1988	-9038,0	-4556,3	-4481,7	-1,2	-0,6	-0,6
1989	-7826,0	-4559,5	-3266,5	-1,0	-0,6	-0,4
1990	-4822,0	-1562,8	-3259,2	-0,6	-0,2	-0,4
1991	-14655,0	-5582,7	-9072,3	-1,7	-0,6	-1,0
1992	2233,0	-5373,3	7606,3	0,2	-0,6	0,8
1993	-11269,0	-7919,6	-3349,4	-1,2	-0,9	-0,4
1994	2447,0	1617,8	829,2	0,3	0,2	0,1
1995	2925,0	15202,0	-12277,0	0,3	1,5	-1,2
1996	8471,0	12401,2	-3930,2	0,8	1,2	-0,4
1997	14930,0	7461,4	7468,6	1,3	0,7	0,7
1998	5534,0	11237,3	-5703,3	0,5	1,0	-0,5
1999	17125,0	7985,9	9139,1	1,4	0,7	0,8
2000	12379,0	2644,4	9734,6	1,0	0,2	0,8
2001	-13482,0	1702,4	-15184,4	-1,0	0,1	-1,1
2002	-12296,0	0,0	-12296,0	-0,9	0,0	-0,9
2003	-6756,0	-9343,6	2587,6	-0,5	-0,7	0,2

## Appendix 2: Data sources and calculation methods

### *Net lending of the general government sector, current prices*

#### Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*; and Statistics Denmark, *Statistical Yearbook*. Other sources: Arbejdsdirektoratet (1957); Hansen (1983); Johansen (1985); Statistics Denmark (2001); Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website; Topp (1995) and Vater (ed.) (1932).

#### Comments:

(1) The public sector covers the central and local government. Furthermore, unemployment benefit societies are included within the public sector with effect from 1907. In 1967 the central government took over the responsibility of financing the share of unemployment benefits not covered by fees from members of the unemployment benefit societies. In the period 1971-1989 the net lending of unemployment benefit societies is assumed to be equal to zero. With effect from 1990 the data on general government net lending comes from the current official version of the national accounts which include unemployment benefit societies within the general government. (2) For the period 1875-1975 data for the central government have been converted from fiscal year to calendar year. (3) In 1910 an amount of 6 million kroner are included as expenditures in the central government net lending representing the central governments pay-in to the liquidation fund of 1910 which were to guarantee deposits in a number of failed banks. (4) The proceeds from the sale of the Danish West Indies (87 million kroner) in 1917 are included as revenue in the central government net lending. (5) The compensation paid to Germany (101.4 million kroner) in 1920 as compensation for assets in Sønderjylland (the northern part of the old Duchy of Schleswig) are included as expenditures in the central government net lending. (6) In 1928 an amount of 136 million kroner are included as expenditures in the central government net lending representing the central governments expenditures in the reconstruction of Landmandsbanken. (7) The German occupation forces expenditures in Denmark during the years 1940-1945 (in million kroner: 1940: 804.6; 1941: 852.6; 1942: 701.7; 1943: 1902.5; 1944: 2728.0; and 1945: 574.1) are included as expenditures (debt write-off) in the central government net lending in the period 1940-1945. In the central government accounts most of these expenditures were recorded in the revaluation account during the years from 1946 and forward while the rest was included among the current and capital expenditures. The appropriate adjustments for the years 1946 and forward have been made to avoid double recording of the expenditures. (8) For the period 1900-1975 data for the local government

have been converted from fiscal year to calendar year. (9) For the fiscal year 1965/66 no suitable figures for the local government capital expenditures are available in the accounting statistics due to changes in the tax assessment of real property. The figure has been estimated so that the net lending of the local government for this year matches the change in the local government debt. (10) Data for the net lending of the unemployment benefit associations in the period 1907-1970 have been converted from fiscal year to calendar year. (11) For the period before 1931 data for the net lending of the unemployment benefit associations has been compiled as movement in the net wealth position of the unemployment benefit associations.

***GDP at factor costs, current prices***

Sources:

Other sources: Hansen (1983); Hansen & Henriksen (1984); Statistics Denmark (2001); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

Comments:

(1) Since 1921: Including Sønderjylland (the northern part of the old Duchy of Schleswig).

***General government GDP at factor costs, current prices***

Sources:

Other sources: Hansen (1983); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

Comments:

(1) Since 1921: Including Sønderjylland (the northern part of the old Duchy of Schleswig).

***Private sector GDP at factor costs, current prices***

Comments:

(1) Calculated as total GDP at factor costs less general government GDP at factor costs.

***Indirect taxes net of subsidies, current prices***

Sources:

Other sources: Hansen (1983); Hansen & Henriksen (1984); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

Comments:

(1) 1990-2003 calculated as GDP at market prices less GDP at factor costs.



***Gross domestic product (GDP) at market prices, current prices***

Other sources: Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

Comments:

(1) 1875-1989 calculated as GDP at factor costs plus indirect taxes net of subsidies.

***Total taxes to general government, current prices***

Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*. Other sources: Kærgård (1991) and Statistics Denmark (2001).

Comments:

(1) Total taxes include social security contributions (including membership contributions to unemployment benefit associations).

***Unemployment benefits, current prices***

Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*. Other sources: Kærgård (1991); Schmidt-Sørensen (1985); Statistics Denmark (2001); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

Comments:

(1) For the period 1875-1962 the general government expenditures on unemployment benefits have been calculated as the number of unemployed persons multiplied by the daily unemployment related government expenditures per unemployed person and the number of working days per year. (2) For the period 1875-1902 the daily unemployment related government expenditures per unemployed person has been interpolated from the level in 1903 and the development in nominal GDP at factor costs per employed person.

***Labour force, 1000 persons***

Sources:

Other sources: Hansen (1983).

Comments:

(1) In the period since 1903 calculated as employment plus unemployment. (2) Adjusted for break in series in 1903.

### ***Employment, 1000 persons***

#### Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*. Other sources: Hansen (1983); Statistics Denmark (2001); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

#### Comments:

(1) In the period 1875-1902 calculated as labour force less unemployment. (2) Since 1921: Including Sønderjylland (the northern part of the old Duchy of Schleswig). (3) Adjusted for break in series in 1948 and 1990.

### ***Unemployment, 1000 persons***

#### Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*. Other sources: Christensen (1975); Cohn (1958); Pedersen (1977); Statistics Denmark (2001); and Warming (1913).

#### Comments:

(1) For the period 1875-1899 interpolated from the number of unemployed persons in 1900 and the development in the number of persons receiving social security benefits from the local authorities in Copenhagen. (2) In the period 1900-1902 interpolated on the basis of the unemployment among labour union members in November of the year concerned and seasonal factors based on the period 1906-1910. (3) 1903-1910 average number of insured unemployed persons multiplied by the ratio between the total number of unemployed (insured and non-insured) and the number of insured unemployed in 1911. (4) Since 1911 average annual number of insured and non-insured unemployed persons. (5) For the years 1931-1939, the calculated figures (64, 118, 116, 97, 91, 95, 114, 116, 104) are quite close to the figures (73, 127, 119, 98, 91, 94, 109, 112, 101) calculated in Topp (1997), also covering the number of thousand insured and non-insured unemployed persons.

### ***Unemployment, per cent***

#### Comments:

(1) Calculated as unemployment in per cent of the total labour force. (2) For the years 1937-1940, the calculated figures (5.5; 5.5; 4.9; and 6.8) are quite close to the figures (5.6; 5.6; 5.2; and 6.8) published in Danmarks Statistik (1996), also covering insured and non-insured unemployed in per cent of the total labour force.