

Denmark: Selected Issues

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DENMARK

Selected Issues

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Approved by the European Department

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I. DANISH FOR ALL? BALANCING FLEXIBILITY WITH SECURITY: THE FLEXICURITY MODEL¹

A. Introduction

1. **The Danish labor market model, the so-called flexicurity model, has been widely praised recently for its association with a low unemployment rate and a high standard of social security for the unemployed.**² Within this model, a high degree of labor market flexibility coexists with a high level of social protection engendered by generous unemployment benefits and active labor market policies. At a time when most European countries are facing chronically high unemployment rates, but the needed labor market reforms often face strong political opposition—for fear that they can significantly erode job and income security—the Danish flexicurity model seems to suggest that this fear is unfounded and that it is possible to reduce the unemployment rate with a model that balances flexibility with security. Thus, the flexicurity model looks increasingly attractive to policymakers in Europe. At recent European Commission summits on the Lisbon strategy, member states were invited to pursue reforms in labor market and social policies under an integrated flexicurity-type approach, although without concrete guidelines as to how this integrated approach should look.

2. **The relationship between the Danish flexicurity model and its unemployment performance, however, is not as straightforward as it seems.** Denmark has traditionally had a combination of a relatively flexible labor market and a high level of income protection: Danish workers have had little protection from dismissal, but their income has been protected (Wilthagen, Tros, and van Lieshout, 2003). The economic performance under the flexicurity model has been uneven. In the early 1980s, Denmark experienced a dismal macroeconomic performance, with high and rising unemployment, high inflation, chronic current account deficits, and mounting public deficits (Box 1 and Gaard and Kieler, 2005). In the 1990s, labor market reforms were implemented to modify the flexicurity model: the maximum period for participation in active labor market programs was reduced from eight to five years in 1998 and to four years after 2000, and the eligibility criteria for unemployment benefits were tightened. As a result, the unemployment rate fell sharply during 1993–2003.

¹ Prepared by Jianping Zhou (jzhou1@imf.org).

² See Schubert and Martens (2005) and Sapir (2005).

Box 1. Denmark: Key Macroeconomic Developments^{1/}

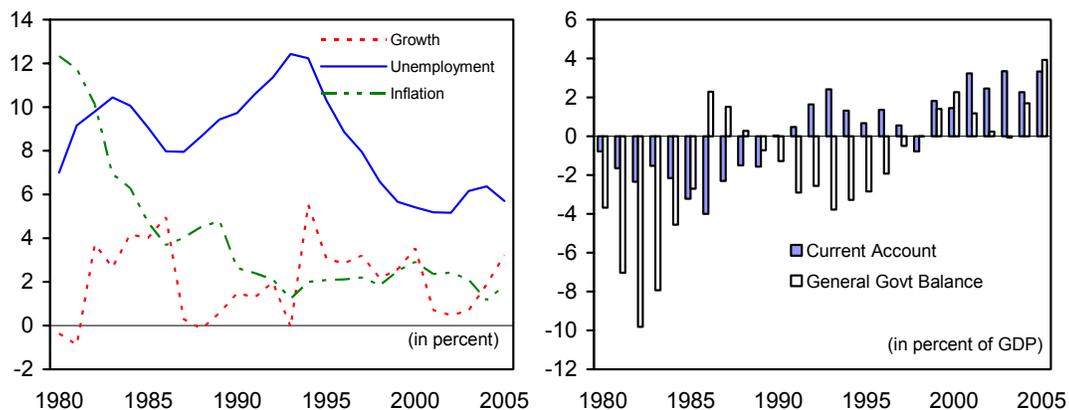
Denmark's macroeconomic performance was rather unsatisfactory in the early 1980s. In 1982, both inflation and unemployment rose to 10 percent, growth turned negative, the budget deficit reached 9 percent of GDP, and the current account deficit peaked at 4 percent of GDP.

In 1982, the new coalition government adopted a program aiming at restructuring the economy toward the tradable sector, reducing the current account deficit, developing domestic energy resources, and reigning in public expenditures. The current account deficit was to be reduced through improvements in competitiveness and restraining domestic costs, rather than previous attempts to use exchange rate devaluations. Unemployment and sickness benefits were frozen in nominal terms, wage indexation suspended, and growth in public wages and transfer payments limited. The exchange rate was fixed within the context of the Exchange Rate Mechanism (ERM).

By the mid-1980s, inflation had dropped significantly, unemployment had fallen and stabilized, private investment had boomed, and output growth had rebalanced toward exporting industries. As additional fiscal packages, consisting mainly of energy taxes and cutbacks in public works, were adopted, the budget balance turned positive. However, in 1987, after four years of strict income policies, wage negotiations resulted in a very generous settlement. As conditions tightened, growth slowed, averaging 0.6 percent in 1987-93.

The period of slow growth ended in 1993, supported both by fiscal stimulus (a deliberately underfunded income tax cut) and monetary policy (lowered policy rates following an August 1993 speculative attack). A mix of tax and labor market reforms aimed at increasing labor participation was introduced, including required training programs for the unemployed, paid leaves for education, abolishment of an early retirement program, and the lowering of personal income taxes.

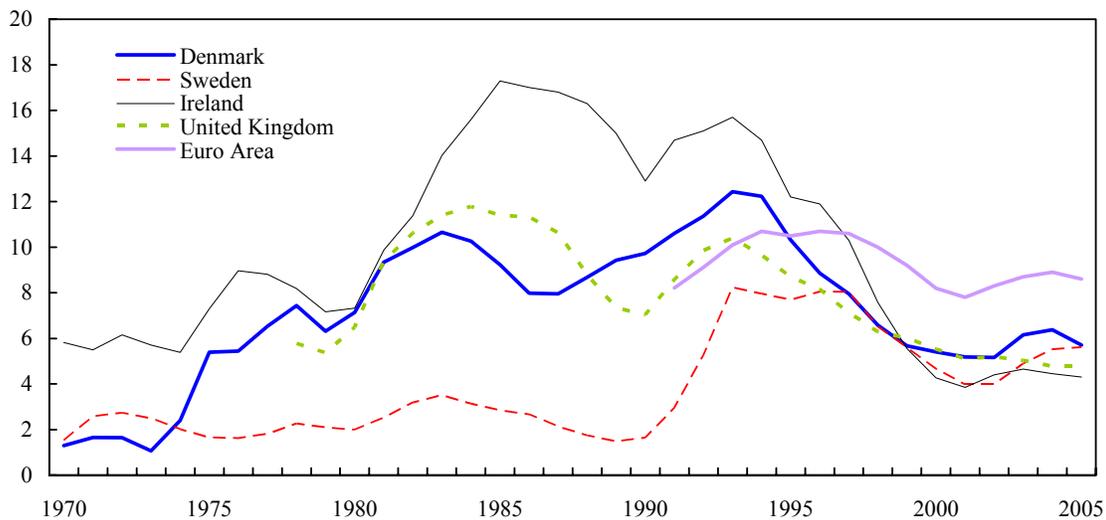
Between 1993 and 2000, Denmark enjoyed a period of rapid economic growth. Labor market reforms reinforced growth, reducing the unemployment rate to a 25-year low of 5 percent. Fiscal reforms and the growing economy transformed fiscal deficits into sizable surpluses. Public debt fell from almost 80 percent of GDP in 1993 to 45 percent by the end of the decade. As domestic savings rose and Denmark registered current account surpluses throughout the 1990s, its foreign debt position improved markedly. In 2001, however, a slowdown began as fiscal measures aimed at cooling an overheating economy held back private consumption; meanwhile, a downturn in the global economy spilled over into net exports, and growth fell below 1 percent in 2002-03. In recent years, there was a clear revival, and growth reached more than 3 percent in 2005.



^{1/} Authored by Robert Tchaidze. See Denmark 2006 Staff Report for further details on recent developments.

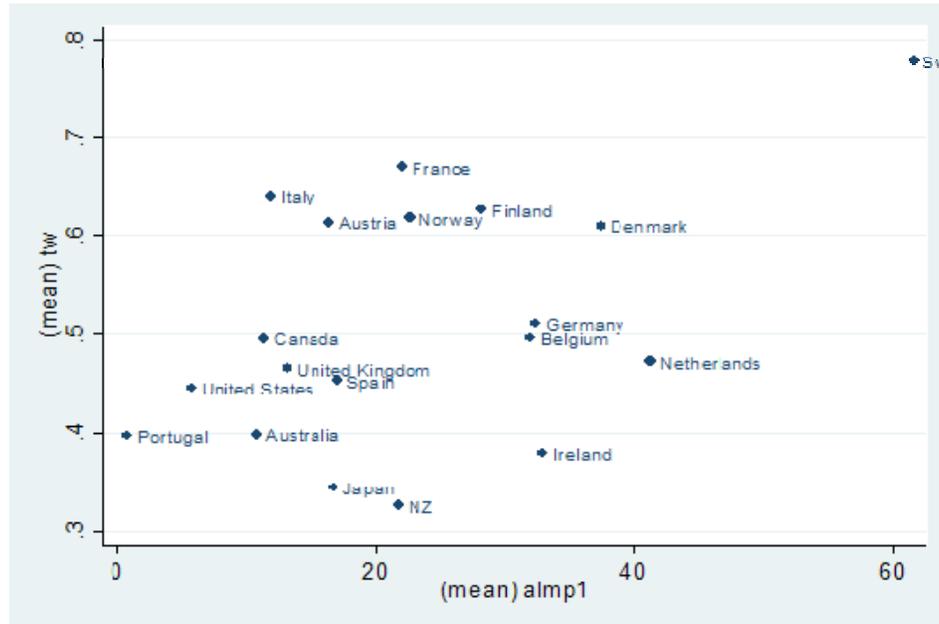
3. **Other countries have been able to reduce their unemployment rates to low levels with rather different social models** (Figure 1). For example, Sweden, which is comparable to Denmark in terms of the size of its public sector and its generosity of the welfare system, has a more rigid labor market (as measured by the overall strictness of protection against dismissals) than Denmark but has maintained a lower unemployment rate during most of the last 30 years. Ireland and the United Kingdom, on the contrary, have achieved substantial reductions in their unemployment rates with the so-called Anglo-Saxon model, characterized by relatively low employment protection and low replacement rates.

Figure 1. Denmark and Selected Countries: Unemployment Rate, 1970-2005
(In percent)



Source: WEO.

4. **Moreover, often overlooked is the high cost of implementing the flexicurity model.** Denmark has one of the largest tax wedges on labor income among European countries; this is necessary to finance its high spending on labor market programs and unemployment benefits (more than 5 percent of GDP). The following figure shows that the average tax wedge on labor income (tw) for the period 1985 to 2002 exceeded 60 percent, and about 40 percent of per capita GDP was transferred to finance the average spending on active labor market programs for each unemployed ($almp1$). The large tax wedge reduces employment, raising the question of whether the flexicurity model efficiently combines high levels of social security and a flexible labor market. It also brings up another fundamental question: is it feasible to implement the Danish model in countries facing high unemployment rates and budgetary difficulties?



5. Against this background, this paper aims to answer two questions: how much of the Danish economic performance, especially with regard to unemployment, can be attributed to the flexicurity model? Can and should this model be emulated in other European countries?

6. Section B of this paper identifies the key policy elements of the Danish flexicurity model. Using a panel of 19 industrial countries over the period 1960–2002, Section C investigates empirically the relationship between the unemployment rate and these key policy elements. Section D sets out the theoretical model, which is applied to the French economy, to illustrate the main results of the model. Section E concludes by noting policy implications.

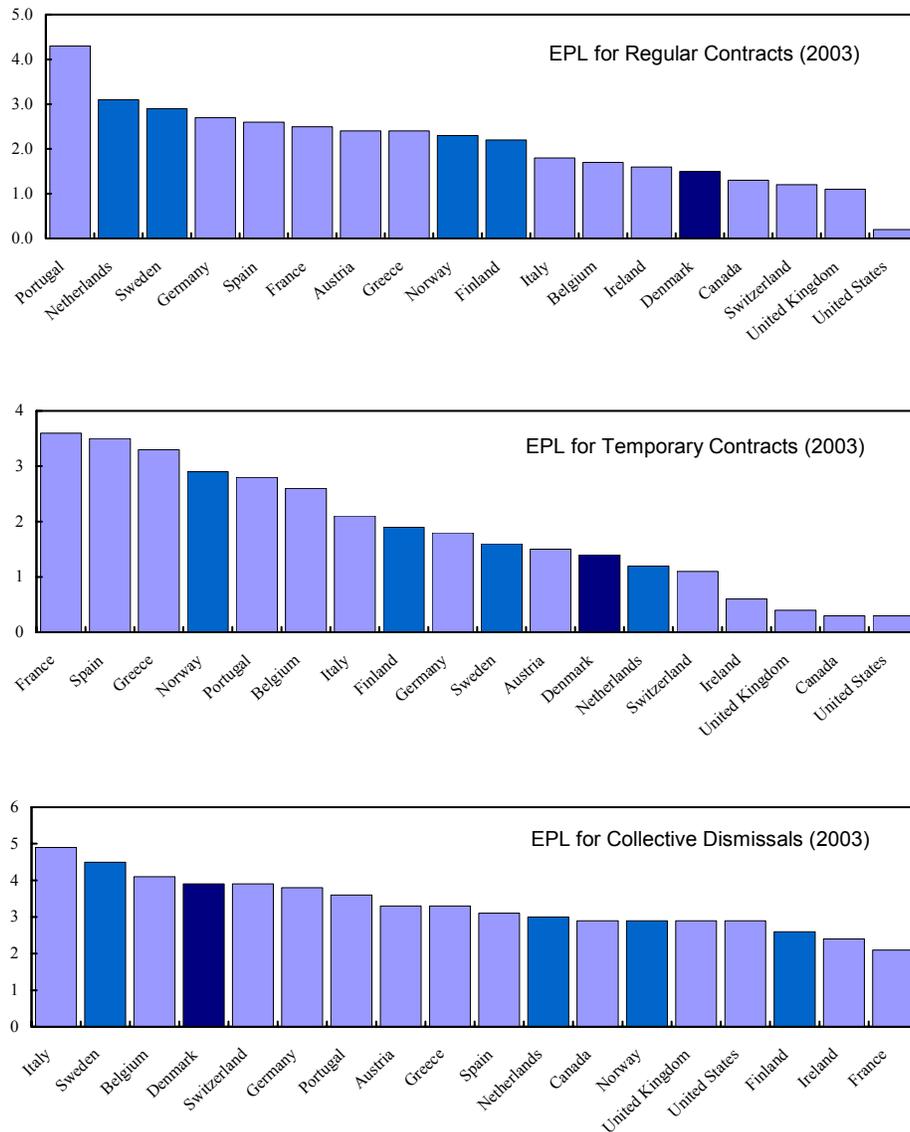
B. Key Policy Elements of the Danish Flexicurity Model

7. **While the flexicurity model has attracted much attention in public debate, there is no clear consensus on its definition.**³ In the public debate, the Danish model is often considered as part of the so-called Nordic model, which comprises the models of Denmark, Finland, Norway, and Sweden. Sapir (2005), however, categorizes the Danish model under his version of the “Nordic” model, which consists of a different set of countries (comprising Finland, the Netherlands, and Sweden). Using statistical cluster analysis, Gaard (2005) concludes that, classified by labor market regimes, the Danish model is part of the “North European” regime, which also includes the Netherlands and Sweden. Among these countries, however, there are large differences in the degree of labor market flexibility (Figure 2) and in

³ For example, see Gazier (2006), Madsen (2006), Bredgaard, Larsen, and Madsen (2005), and Wilthagen, Tros, and van Lieshout (2003).

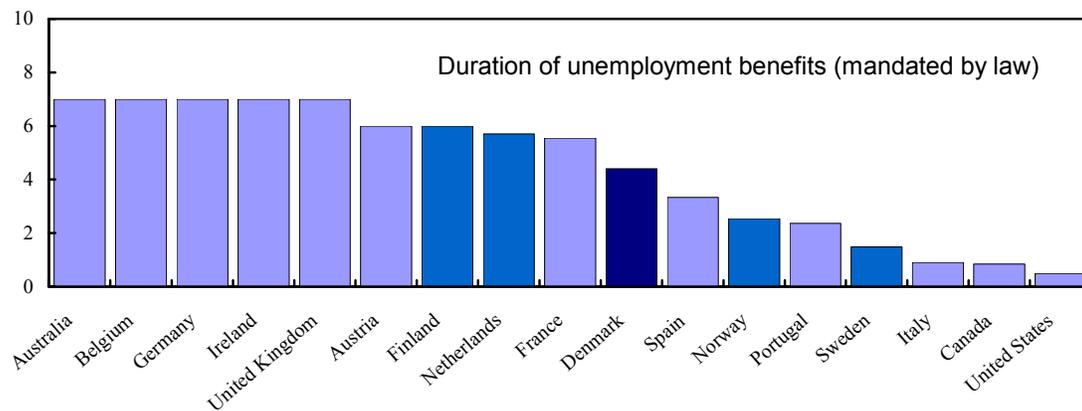
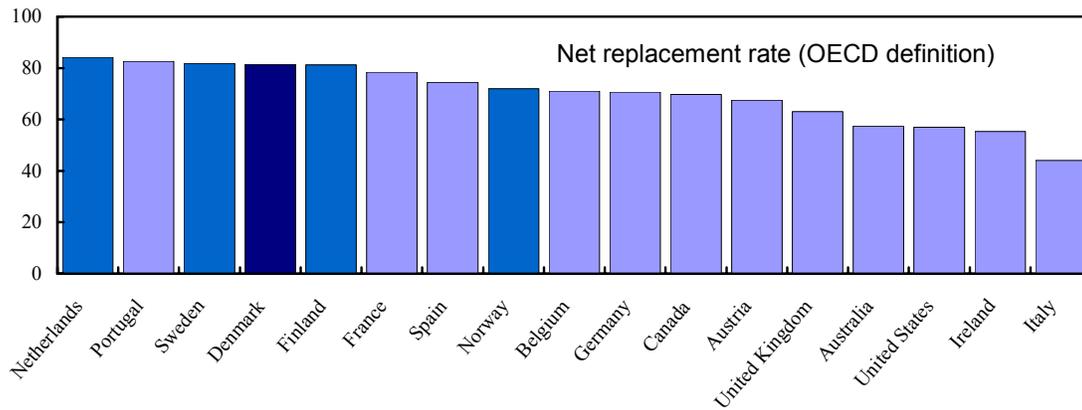
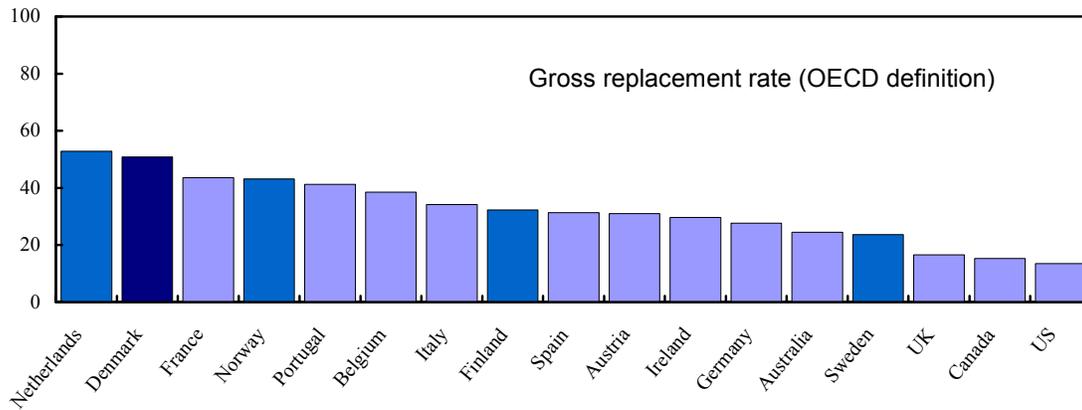
the generosity of unemployment benefits (Figure 3). Moreover, their unemployment performances diverge as well. Wilthagen, Tros, and van Lieshout (2003) define the flexicurity model as a policy strategy that attempts to simultaneously enhance the flexibility of labor markets and maintain a high level of job and employment security. Bredgaard, Larsen, and Madsen (2005), however, disagree. In their view, the Danish flexicurity model is not a product of a carefully designed and deliberate strategy but the by-product of a long historical and institutional evolution and social compromises. Therefore, they doubt it would be possible to duplicate the flexicurity model in other countries, a view also shared by Anderson and Svarer (2006).

Figure 2. Denmark and Selected Countries:
Strictness of Employment Protection Legislation (EPL)
(Higher number corresponds to stricter EPL)



Source: OECD.

Figure 3. Denmark and Selected Countries: Unemployment Benefits



Source: Gaard (2004).

8. **This lack of consensus is also partly because the Danish flexicurity model has been continuously modified and fine-tuned.** While this may reflect social compromises, this ongoing fine-tuning is part of the reform effort to limit the adverse employment effects

of the generous social benefits system and to improve employment. Since the early 1990s, the government has tightened the eligibility criteria for unemployment benefits, shortened the maximum period for participation in active labor market programs, and reduced benefit durations (Box 2).

Box 2. Denmark: Key Labor Market Reforms^{1/}

Denmark has been undergoing major reforms of labor market policies since 1993. The initial emphasis was placed on sabbatical leave and other job rotation schemes that tended to lower participation rates. The employment effect was limited. The emphasis has subsequently shifted to strengthening work incentives and enhancing employability. Although benefits have remained generous, reflecting the priority that the government attaches to preserving a fairly egalitarian distribution of income, the reforms have been associated with reductions in structural unemployment, particularly for the young and long-term unemployed.

Since the end-1990s, the authorities have introduced further measures to improve the functioning of the labor market. Apart from the income tax reform, which will gradually lower the marginal tax rates on labor incomes, labor market measures include the following:

- Unemployed are now obliged to accept job offers outside their occupational area after three months of receiving unemployment benefit;
- The mandatory “activation” of the unemployed after six months of unemployment was *extended* to all persons under 25; failure to activate (i.e., to accept a job or a placement in a training/retraining scheme) entails a complete loss of benefits;
- The minimum age for extended benefits was raised from 50 to 55 years;
- The maximum unemployment benefit period was reduced from five to four years;
- Training for the unemployed has become more targeted, and participation in educational leave schemes has become more restrictive;
- The full- and part-time early retirement schemes were merged, creating a more flexible, unified, and ostensibly more transparent system;
- Tax and benefit incentives were given to prolong full-time working life until 62 years of age; these include, inter alia, larger tax deductibles “earned” by working until an older age and a change in the payment profile of early retirement benefits; and
- Income incentives were enhanced to discourage early retirement.

The welfare agreement of June 2006 unveiled, inter alia, proposals to further reduce the time limit for activation from one year to six months and abolish the extended entitlement period for the 50–55 age group.

1/ IMF staff reports on Denmark.

9. Any assessment of the flexicurity model would require a breakdown of labor market flexibility and social security into their various components. Wilthagen, Tros, and

van Lieshout (2003) offer a useful approach. In their framework, labor market flexibility consists of one or a combination of the following four dimensions:

- external flexibility (e.g., flexibility of hiring and firing);
- internal flexibility (e.g., flexibility of working hours, overtime, part-time work);
- functional flexibility (e.g., possibility of holding more than one job and flexible organization of work); and
- wage flexibility (e.g., the absence of binding minimum wages or wage indexation).

Similarly, social security involves the following four elements:

- job security (high probability of retaining one's current job);
- employment security (high probability of finding another job quickly in case of a layoff);
- income security (income protection in the event of job loss); and
- “combination” security (the ability to combine paid work with other social responsibilities and obligations).⁴

While their approach provides a systematic way to study the social models that have been adopted in European countries in various forms and their evolution over time, it does not always distinguish policies from outcomes. Moreover, some of the policy elements are difficult to quantify.

10. The analysis in this paper is based on the framework discussed above, but attempts to more clearly distinguish policies from outcomes. This is particularly important when assessing whether the Danish model can be copied by other countries. Given certain data limitations, this study focuses on the following policies and institutions providing labor market flexibility and security for the unemployed:

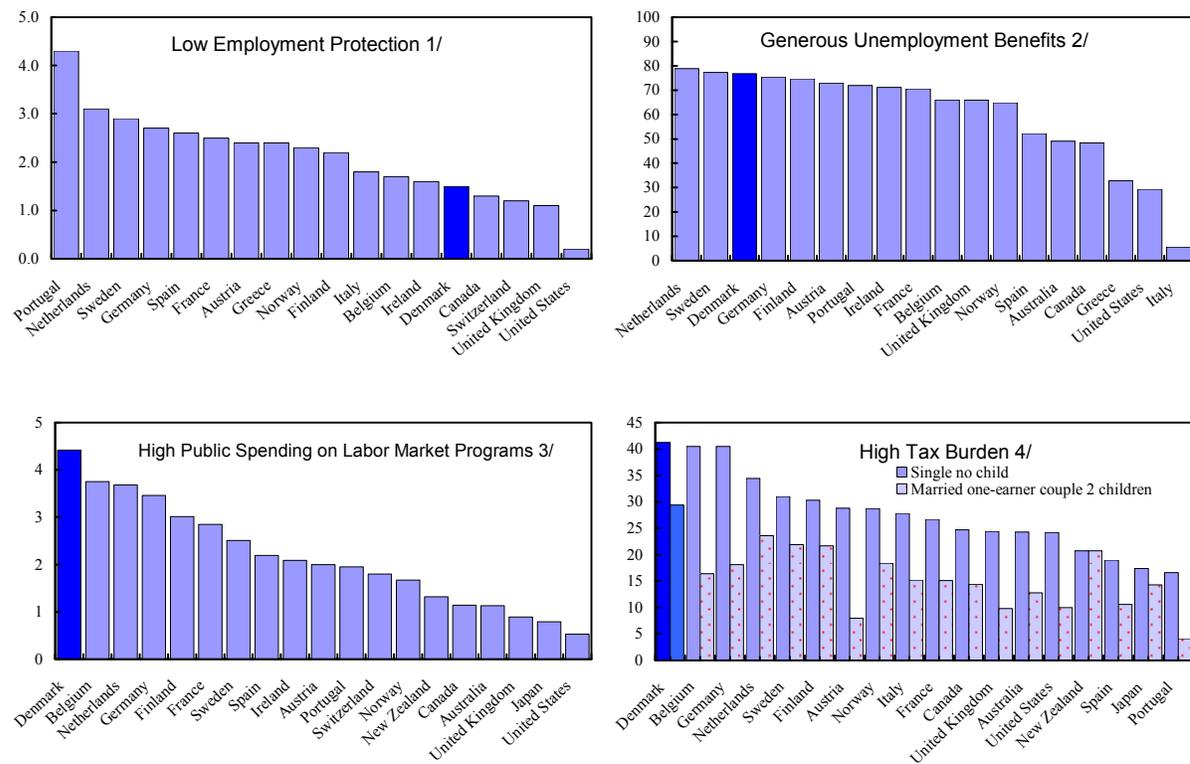
- few restrictions on hiring and firing (external flexibility);
- a wage-setting and bargaining framework conducive to wage flexibility;
- a high level of unemployment benefits (providing income security); and
- active labor market policies (providing employment security).

These policies and institutions can be quantified using the data sets from the OECD and Gaard (2005).

⁴ This can be seen as job flexibility from the workers' perspective—for example, the possibility to take long-term maternity leave with the guarantee of reemployment. In this context, this type of security can be key to female participation and employment.

11. Based on these quantified policy indicators, four key features of the Danish flexicurity model are the focus of this paper (Figure 4). First, **a very flexible labor market**: measured by the restrictiveness of employment protection legislation, the Danish labor market is more flexible than many other European countries. Second, **generous unemployment benefits**: the average net replacement rate, at about 80 percent, is among the highest in Europe. Third, **high spending on active labor market programs**: average spending on active labor market programs per unemployed is also one of the highest. Finally, **a large tax wedge** on labor income: the flexicurity model is costly.

Figure 4. Denmark and Selected Countries: Key Elements of the Danish Flexicurity Model



Source: OECD.

1/ OECD index on employment protection legislation (EPL) for regular jobs (2003). Higher numbers indicate stricter EPL.

2/ Average net replacement rate over 5 years of unemployment and includes social benefits (2004).

3/ In percent of GDP (2003).

4/ Income tax plus employee contributions less cash benefits, as percent of gross wages (2004).

C. Unemployment Performance and the Flexicurity Model: An Empirical Analysis

12. **The Danish flexicurity model has attracted attention, in particular because it has been associated with a low unemployment rate, now below 5 percent.** For the workers, a low unemployment rate augments the income security from generous unemployment benefits with a perception of employment security (i.e., there is a high probability of finding another job quickly in case of a layoff). A low unemployment rate is also important for the

financial viability of the flexicurity system—it ensures that the cost of labor market policies remains sustainable and that the tax wedge does not widen excessively.

13. **It is therefore key to assess how various policy elements of the flexicurity model may have contributed to the low unemployment rate in Denmark.** The advocates of this model claim that the reduction in the unemployment rate since 1993 is due to the flexibility in the labor market and the active labor market policies, which more than offset the negative impact of the high labor taxes on employment. Is this claim supported by cross-country evidence? How much of the reduction in unemployment was attributable to the active labor market policies?

14. **The purpose of the empirical exercise is to identify the policy elements of the flexicurity model that are significantly correlated to the unemployment rate.** The basic empirical work consists of running cross-country panel regressions of the following equation:

$$um_{it} = \alpha_0 + \alpha_i + \tau_i + \sum_j \beta_j x_{jit} + \sum_k \beta_k y_{kit} + \sum_l \beta_l z_{lit} + \lambda \cdot cycle + v_{it},$$

where I = country index; t = year; x_j = policy variables contributing to labor market flexibility; y_k = policy variables contributing to income security; z_l = active labor market policy variables; α_0 is a constant term; α_i captures the unexplained country-specific effect; τ_i is the country-specific time trend; and v_{it} is the error term. The panel consists of 15 countries over the period 1980 to 2004. The list of variables included in the estimations is presented in Box 3. The empirical analysis assumes that the equilibrium unemployment rate is influenced by the set of policy elements of the flexicurity model, which are the focus of this paper. The analysis also controls for the cycle and other unexplained country- and time-specific effects.

15. Specifically, we estimate four equations. Equation (1) is based on the specification in Gaard (2005), while Equation (2) includes year dummies to capture interactions between policy variables and common shocks. Equation (3) aims to reproduce the results in Blanchard and Wolfers (2000). Finally, Equation (4) introduces a lagged dependent variable to capture both the short- and long-run unemployment impact of policy variables.

Box 3. Denmark: Variables Included in the Estimations

Policy elements of the flexicurity model that determine labor market flexibility:

- *employment protection legislation (EPL)*: OECD or World Bank indicators on the strictness of EPL;
- *wage-setting institutions that determine wage flexibility*: wage-setting institutions, trade union density, and collective bargaining coverage (OECD data); and
- *other measures of wage flexibility*: wage compression (trend in earnings dispersion 1980–2001, OECD data).

Policy elements of the flexicurity model that determine social security:

- *generosity of unemployment benefits*: the average of unemployment compensation rates (gross) for two income levels and three family types over a five-year period (OECD data);
- *gross and net replacement ratio*: Gaard (2005);
- *duration of benefits*: (1) legal durations; and (2) index constructed from gross unemployment benefits over five years (Gaard, 2005);
- *active labor market policies*: expenditure on active labor market policies (ALMP) (OECD data, 1980–2003); and
- *employment enforcement*: index calculated by Gaard (2005).

Costs and financing of the flexicurity model:

- *tax wedge*: OECD data on labor taxes; and
- total public spending on labor market programs: OECD data.

Macroeconomic variables:

- *business cycle*: logarithm of demeaned GDP (in volume); and
- output gaps.

In addition, an index of product market deregulation (OECD data) is used.

16. **The empirical results are largely consistent with predictions based on existing theories and the findings of other studies** (Table 1). Generous unemployment benefits (as measured by the replacement rate) tend to increase the structural unemployment rate by reducing incentives to work and raising reservation wages. A large tax wedge on labor income is likely to also increase the unemployment rate through its negative effect on labor demand, as well as on labor supply. However, a flexible labor market (as measured by less strict EPLs and institutions supporting wage flexibility) helps reduce the structural unemployment rate by improving labor market dynamics. Indeed, there is empirical evidence

that countries with stricter EPLs tend to have a higher unemployment persistence. Moreover, the EPLs could have a significant influence on how the unemployment rate adjusts to shocks (Blanchard and Wolfers, 2000). We found that active labor market policies contribute to low structural unemployment rates, which is consistent with the findings of other empirical studies.⁵ However, this may be partly due to a well-recognized statistical problem: participants in active labor market programs are considered as employed.

Table 1. Denmark: Estimated Equations

Dependent variable: u(t)	Equation 1 1/	Equation 2 2/	Equation 3 3/	Equation 4
u(t-1)				0.6910 *** 0.0439
Expenditure on ALMP	-0.0011 *** 0.0001	-0.0011 *** 0.0001	0.0011 *** 0.0001	0.0004 *** 0.0001
EPL	0.0006 0.0080	0.0014 0.0106	0.1850 * 0.0107	0.0096 * 0.0005
Overall gross replacement rate	0.0015 *** 0.0004	0.0017 *** 0.0003	0.0030 *** 0.0004	0.0002 ** 0.0004
Benefit duration			-0.0732 *** 0.0146	
Total tax on labor	0.0244 0.0361	0.0339 0.0361	0.0524 * 0.0297	0.0070 0.0221
Availability requirement	-0.0137 0.0203	-0.0225 0.0211		
Centralization of wage negotiations	0.0015 0.0041	-0.0023 0.0041	0.0023 0.0037	
Union density	0.1445 *** 0.0242	0.1363 *** 0.0255	0.1991 *** 0.0275	0.0709 *** 0.0200
Output gaps	-0.6889 *** 0.0153	-0.0309 *** 0.0171		-0.0436 *** 0.0100
NOB	230	230	230	236
R-sq: Within	0.60	0.67	0.71	0.81
Between	0.01	0.01	0.01	0.66
Overall	0.01	0.02	0.01	0.70

Source: IMF staff estimates.

1/ Based on the specification in Gaard (2005).

2/ Equation 1 with time dummies that aim to capture common shocks.

3/ Based on the model specification in Blanchard and Wolfer (2000).

*, **, *** represent statistical significance at 10 percent, 5 percent, and 1 percent, respectively.

⁵ Gaard (2005), Blanchard and Wolfers (2000), Estevão (2003), and Scarpetta (1996).

D. A Model of Dynamic Policies

17. **Can the Danish model be emulated by other European countries to reduce unemployment?** Specifically, can a social model that combines labor market flexibility with generous unemployment insurance and active labor market policies, as we observe in Denmark, be implemented in these countries? The answer is not obvious. For example, Algan and Cahuc (2006) argue that the continental and Mediterranean European countries are unlikely to be able to implement the Danish model because of the lack of “public-spiritedness” of their citizens; in other words, the flexicurity model is hardly sustainable in these countries because generous unemployment benefits raise moral hazard issues that hinder effective implementation. There is also the issue of optimal sequencing in the introduction of the different components of the Danish policy mix. Should the flexibility be introduced before the other policies? Should the other policies be phased in contingent on progress in reducing unemployment? If the initial steps of the reform involve more flexibility than security, is there a way of making it credible to the workers that the reform plan is not simply about “flexibility without security”?

18. **The theoretical model in this paper centers on the financing aspect of the flexicurity model and its negative effect on employment.** A key feature of the Danish model is its high spending per unemployed, financed through a large tax wedge on labor income. As most countries that are tempted to adopt the Danish model will typically start from a high unemployment level (this is generally why they are considering changing their policies), a move toward the Danish model will, in the short run, trigger a sharp increase in the cost of unemployment benefits and active labor market policies, thereby widening the tax wedge, with an adverse impact on labor demand and supply.⁶

The model

19. **The model consists of two equations:** Equation (1) characterizes the dynamics of unemployment as a function of policies:

$$u_t = c + \rho u_{t-1} - \alpha almp_t + \beta plmp_t + \gamma epl_t + \delta tw_t, \quad (1)$$

where u_t is the structural unemployment rate, $almp_t$ is the public expenditure on active labor market policies per unemployed worker (expressed as a share of the average wage), $plmp_t$ is the public expenditure on passive labor market policies (i.e., unemployment benefits) per unemployed worker (expressed as a share of the average wage), epl_t is a measure of the strictness of employment protection legislation, and tw_t is the tax wedge. All coefficients are positive.

⁶ It is assumed that a large part of the funding comes from labor income taxation and social security contributions, which widen the wedge.

20. **Equation (2) gives the budget constraint:** any increase in the expenditure on active or passive labor market policies is financed by a rise in taxes on labor income:

$$(1 - u_t)L_tW_ttw_t = (1 - u_t)L_tW_t\phi + u_tL_tW_t(almp_t + plmp_t). \quad (2)$$

The left-hand side of the equation is the income from imposing the tax tw_t on the wage income $(1 - u_t)L_tW_t$, where L_t is the labor force, and W_t is the average wage. The right-hand side of the equation represents the cost of the labor market policies.

Result 1. The fiscal impact of increasing active or passive labor market policies depends on the level of the unemployment rate.

21. This can be shown by rewriting Equation (2) as

$$tw_t = \phi + \frac{u_t}{1 - u_t}(almp_t + plmp_t). \quad (3)$$

Taking the derivative of Equation (3) gives

$$\frac{\partial tw_t}{\partial almp_t} = \frac{\partial tw_t}{\partial plmp_t} = \frac{u_t}{1 - u_t},$$

which implies that the fiscal impact increases more than proportionately with the unemployment level. For example, the impact of a given change in labor market policies in a country with an initial unemployment rate of 10 percent is 2.1 times higher than that in a country with an unemployment rate of 5 percent.

The long-run steady-state relationship between the policies and the unemployment rate is obtained by setting $u_t = u_{t-1}$:

$$(1 - \rho)u = c + \delta\phi - \alpha almp + \beta plmp + \gamma epl + \delta \frac{u}{1 - u}(almp + plmp).$$

This can be written as a second-order equation for the unemployment rate:

$$u^2 - \lambda u + \kappa = 0,$$

with

$$\lambda = 1 + \frac{c + \delta\phi - (\alpha + \delta)almp + (\beta - \delta)plmp_t + \gamma epl}{1 - \rho}, \text{ and}$$

$$\kappa = \frac{c + \delta\phi - \alpha almp + \beta plmp + \gamma epl}{1 - \rho}.$$

22. The steady-state unemployment rate is given by

$$u = \frac{\lambda \pm \sqrt{\lambda^2 - 4u}}{2}. \quad (4)$$

Result 2. *There could be two equilibrium unemployment rates for a given set of policies: a “good equilibrium” associated with a low unemployment rate and a small tax wedge, and a “bad equilibrium” associated with a high unemployment rate and a large tax wedge. Only the low-unemployment equilibrium is stable.*

23. **The multiple equilibriums are the result of the two-way causality between the level of the unemployment rate and that of the tax wedge.** A large tax wedge tends to reduce employment and increase unemployment, resulting in higher spending on unemployment benefits, which will likely result in an even larger tax wedge on labor income.

24. To prove that only the low-unemployment equilibrium is stable, using Equations (1) and (3), we can obtain

$$u_t^2 - (\eta + \rho u_{t-1})u_t + \rho u_{t-1} + \eta - 1 + \delta(almp_t + plmp_t) = 0, \quad (5)$$

where

$$\eta = 1 + c + \delta\phi - (\alpha + \delta)almp_t + (\beta - \delta)plmp_t + \gamma epl_t.$$

By differentiating Equation (5), we can obtain the first derivative of the period t unemployment rate with respect to the previous period's unemployment rate:

$$\frac{\partial u_t}{\partial u_{t-1}} = \frac{\rho}{1 - \delta(almp_t + plmp_t)/(1 - u_t)^2}.$$

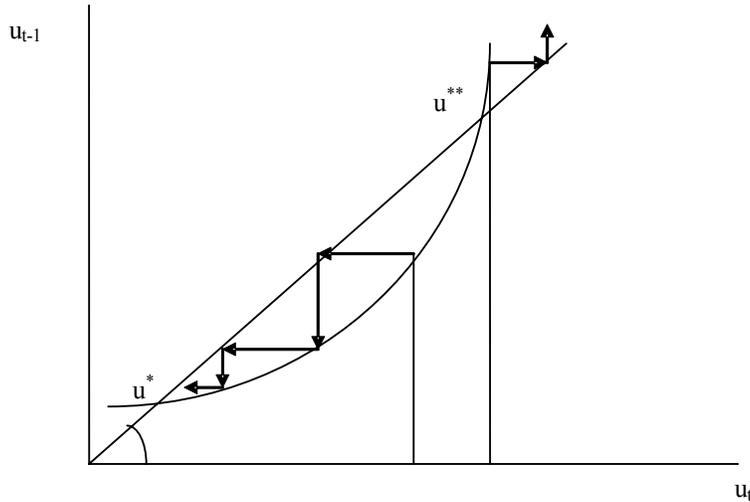
Since $\partial u_t/\partial u_{t-1}$ is increasing with u_t , this implies that if there are two equilibriums, the one with the higher rate of unemployment is unstable because $\partial u_t/\partial u_{t-1} > 1$. The stable long-run equilibrium rate is

$$u^* = \frac{\lambda - \sqrt{\lambda^2 - 4u}}{2},$$

and the unemployment rate u_t converges toward u^* (Figure 5), provided that it is initially lower than

$$u^{**} = \frac{\lambda + \sqrt{\lambda^2 - 4u}}{2}.$$

Figure 5. Denmark: Unemployment Rate Convergence Toward Long-Run Equilibrium



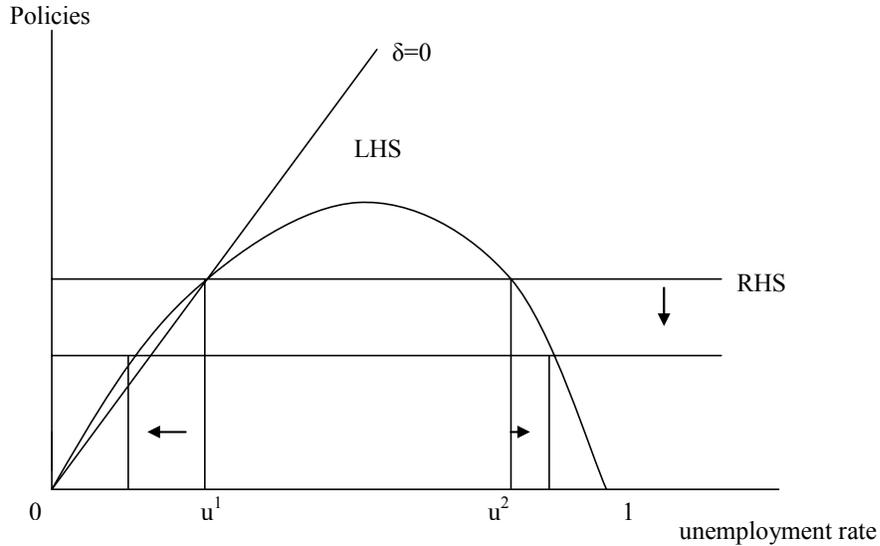
Result 3. The impact of active labor market policies depends on a country's initial level of unemployment and the level of the tax wedge: the unemployment rate declines in a country with a low unemployment rate and a low tax rate but rises in a country with high unemployment and a large tax wedge.

25. This is illustrated by Figure 6. The horizontal line captures the right-hand side of the following equation determined by policy variables:

$$[(1 - \rho) - \frac{\delta}{1 - u} (almp + plmp)]u = c + \delta\phi - \alpha almp + \beta plmp + \gamma epl$$

The concave curve captures the left-hand side of the equation, which is influenced by the level of the unemployment rate. An increase in spending on active labor market programs will shift the horizontal line downward. It has opposite effects on the unemployment rate: it falls in the “good” equilibrium but rises in the “bad” equilibrium. This is mainly because of the dynamics among active labor market policies, taxes, and unemployment rates. In the case where $\delta = 0$ (i.e., when higher spending on active labor market programs is not financed by higher taxes), the concave curve becomes a straight line, and active labor market policies would only lower the unemployment rate.

Figure 6. Denmark: Impact of Active Labor Market Policies



Model simulations

26. **In this section, we calibrate the theoretical model to simulate the policy effects discussed in the previous section.** By doing so, we hope to shed light on the impact of a real-world experiment of transposing the Danish model to other countries. Specifically, we consider a country starting from a steady state with a constant unemployment rate u_0 and constant policies $almp_0$, $plmp_0$, epl_0 , and tw_0 . In period 1, a permanent change in the country's policies take place. The policies become

$$\begin{aligned} almp_1 &= almp_0 + \Delta almp, \\ plmp_1 &= plmp_0 + \Delta plmp, \text{ and} \\ epl_1 &= epl_0 + \Delta epl, \end{aligned}$$

in period 1 and all the following periods $t > 1$. The question is how the unemployment and the tax wedge respond to the policy change, taking into account the endogeneity of the tax wedge to unemployment and that of unemployment to the tax wedge.

27. **The basic assumption is that the structural equation capturing the long-run steady-state relationship between the policies and the unemployment rate apply to all countries and that cross-country differences in the unemployment rate result from differences in policies.** The dynamic equation of the unemployment rate for simulation can be solved as

$$u_t = \frac{1}{2} [\eta + \rho u_{t-1} - \sqrt{(\eta + \rho u_{t-1})^2 - 4(\eta + \rho u_{t-1} + \delta(almp + plmp))}].$$

The dynamics of the unemployment rate can then be derived by iterating this equation starting from an initial level u_0 .

28. **As an example, the model has been calibrated for France.** France has a relatively high unemployment rate and a large tax wedge on labor income (Zhou, 2006). For the simulation, the following parameters have been used, based on the existing literature, as well as on our own empirical analysis:

c	ρ	α	β	δ	\emptyset
0.0014	0.9	0.01	0.01	0.01	0.6

The initial conditions are given by

$$\begin{aligned} almp_0 &= 0.32, \\ plmp_0 &= 0.40, \text{ and} \\ tw_0 &= 0.68. \end{aligned}$$

The variables are expressed as a fraction of 1 (not in percentage points). For example, $tw = 0.68$ means the tax wedge is 68 percent. The initial steady-state unemployment rate is 9 percent ($u_0 = 0.09$).

29. **We consider a reform scenario where the spending on active labor programs is increased to the level in Denmark ($almp_I = 0.55$).** The simulation results are shown in Figures 7 and 8. Two interesting results emerge:

- The immediate impact of the reform is fairly small. While the steady-state unemployment rate will be reduced to 6.9 percent eventually, the adjustment process is very slow; for example, it takes seven years to reduce the unemployment rate by 1 percent. This is partly because the unemployment rate is relatively persistent in France, which may result from, among other factors, the strict regulations on hiring and firing.
- The reform is costly. The tax wedge would widen at the time of the reform to 70 percent to finance the higher spending on active labor market programs; in the model, it takes more than 20 years for the tax wedge to return to its prereform level.

30. **Under this simulation, the employment effect of the tax wedge turns out to be rather small.** What dominates the dynamics is the slow speed of adjustment of the

unemployment rate, which is influenced by labor market rigidities and other rigidities in the product market. This finding reinforces the importance of flexible labor markets.

Figure 7. France: Dynamics of the Unemployment Rate
(In percent)

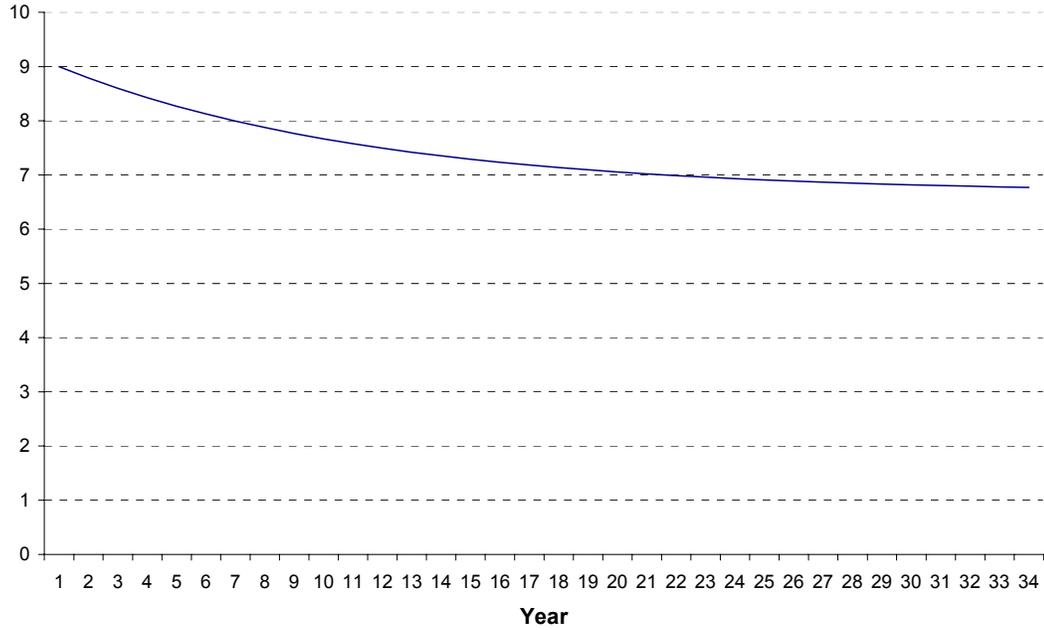
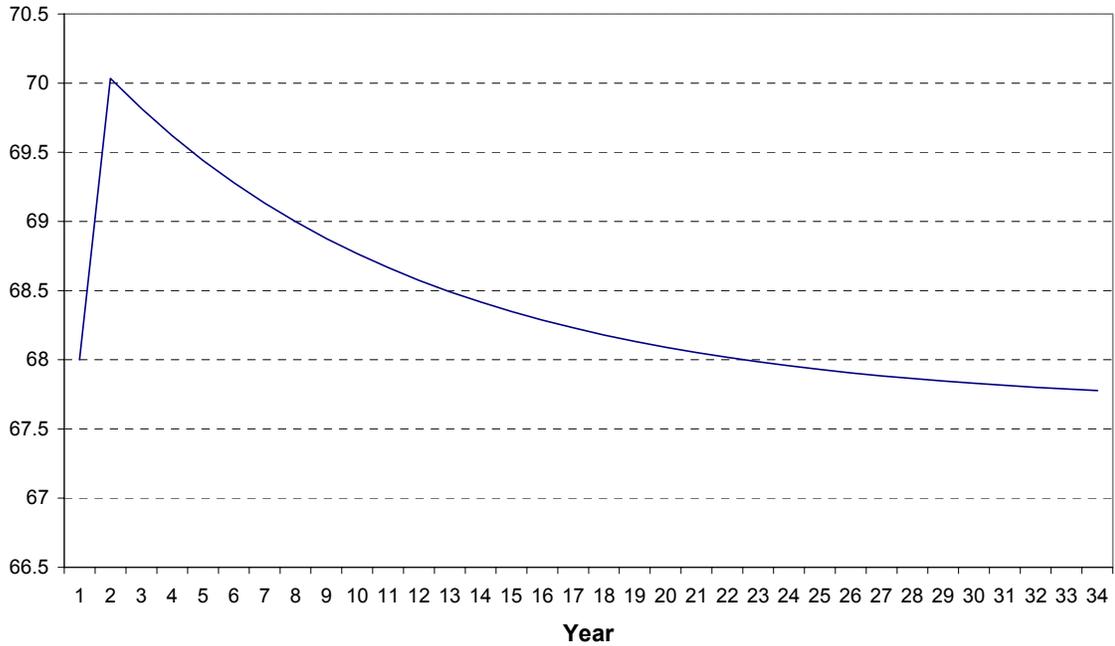


Figure 8. France: Dynamics of the Tax Wedge
(In percent)



E. Concluding Remarks

31. **The Danish flexicurity model has been widely praised for its association with a low unemployment rate and a high standard of social security for the unemployed.**

The model combines a high degree of labor market flexibility with a high level of social protection. While most European countries are facing chronically high unemployment rates and the needed labor market reforms often face strong political opposition, the flexicurity model looks increasingly attractive to policymakers in Europe.

32. **However, whether the Danish model should and can be adopted by other European countries to reduce unemployment is not obvious.** First, Denmark has traditionally had a combination of a flexible labor market and a high level of income protection. Economic performance under this system has varied, as demonstrated by the economic crisis during the early 1980s and the remarkable labor market performance in recent years. Second, other countries have been able to reduce their high unemployment rates to low levels with rather different social models (e.g., Ireland, Sweden, and the United Kingdom). Finally, generous unemployment benefits often raise moral hazard issues that might hinder effective implementation of the Danish model. In this regard, a strict job search requirement and tight eligibility criteria for unemployment benefits are key.

33. **The Danish model is costly.** The tax burden in Denmark is heavy because of the need to finance the country's high spending on labor market programs and unemployment benefits. As most countries that are tempted to adopt the Danish model will typically start from a high unemployment level, a move toward the Danish model will, in the short run, trigger a sharp increase in the cost of unemployment benefits and active labor market policies, thereby widening the tax wedge, with an adverse impact on labor demand and supply. This implies that the Danish model may not be suitable for countries facing high unemployment and budgetary difficulties. Using a calibrated model for France, the paper finds that implementation of the flexicurity model could be costly, and reduction in structural unemployment during the first few years might be limited.

34. **Nonetheless, certain key aspects of the Danish model could usefully be studied and considered by other countries.** Among others, they include the various relationships between the population's willingness to accept labor market flexibility, its confidence in a well-functioning social safety net, and the accompanying need to develop effective labor market policies in order to avoid high costs and perverse incentives. The Danish government's constant awareness and analysis of the challenges facing the flexicurity model and its ability to respond to them with policy actions are noteworthy in this regard. For instance, since the economic crisis in the early 1980s, reforms have been implemented to shorten the maximum period for participation in active labor market programs and tighten the eligibility criteria for unemployment benefits.

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II. HOUSING MARKET DEVELOPMENTS IN DENMARK⁷

A. Introduction

35. **House prices in Denmark have appreciated rapidly in recent years.** After a prolonged period of rather moderate price increases—during which house prices in many other European countries increased more rapidly—there was a sharp acceleration of Danish house prices in recent years. During 2005, house prices in Denmark increased by more than 20 percent, which was one of the highest rates of increase worldwide. This study identifies the possible factors behind the increase in Danish house prices. To what extent can the recent increases be explained by general factors such as developments in income and interest rates, and what has been the impact of Denmark-specific factors, such as the functioning of the Danish mortgage market and the taxation of housing?

36. **The paper is organized as follows.** In Section B, we present selected stylized facts about Danish house price developments, including comparisons to changes in rents and construction costs. Developments in Danish house prices are then compared to those in other European countries. We also provide some tentative empirical test results. We then move on to two more qualitative factors that are likely to have contributed to developments in the Danish housing market in recent years: Section C deals with the special role of the financial sector, and Section D focuses on tax treatment affecting the market. Section E concludes.

B. Selected Stylized Facts and Empirical Results

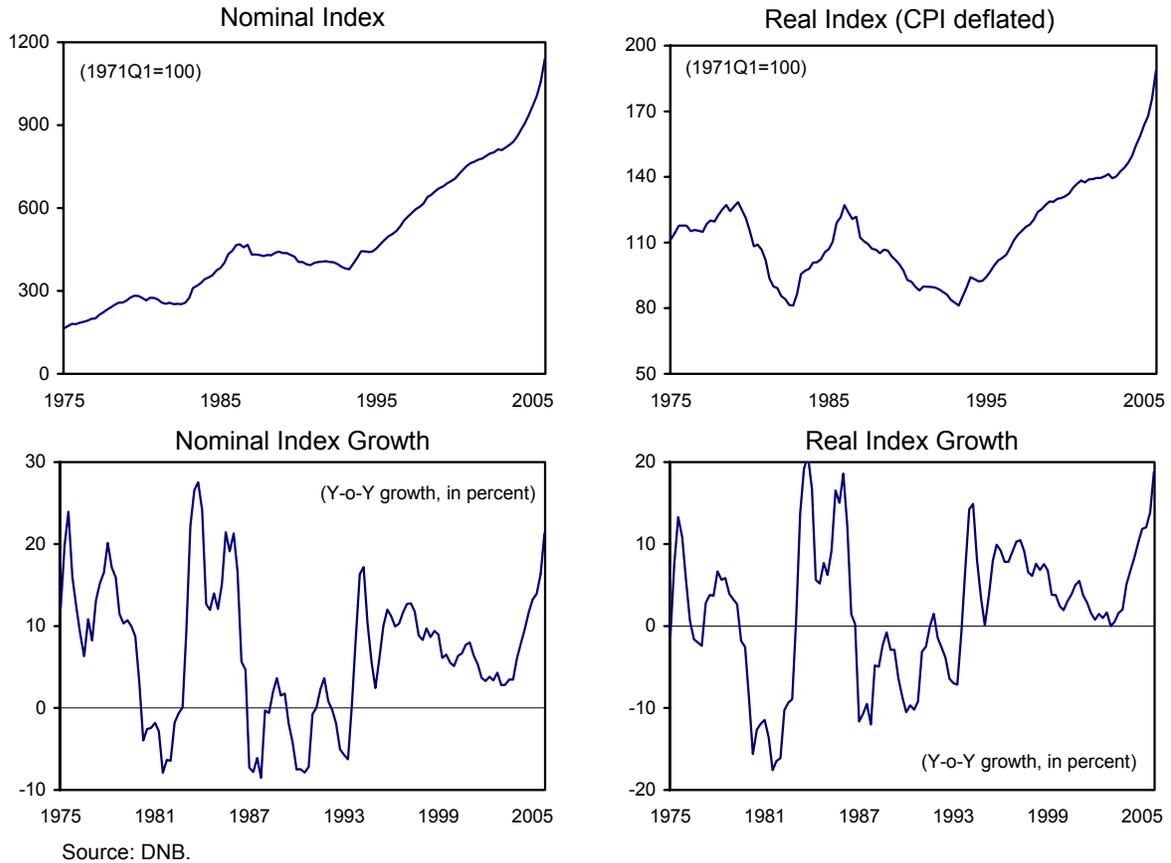
Developments in the Danish housing market

37. **Since the 1970s, the Danish housing market has undergone two periods of distress—in the early 1980s and in the late 1980s/early 1990s.** Figure 1 demonstrates developments in the quarterly house price indices—nominal and real⁸—as well as their growth rates. The first “boom-bust” occurred in the early 1980s, with a trough in 1982:Q3 and year-on-year growth rates falling to -17.6 percent (for the real index) and -7.9 percent (for the nominal index) in 1981:Q3. The second one occurred in the early 1990s, with a trough in 1993:Q2 and year-on-year growth rates falling to -10.2 percent (real) and -7.9 percent (nominal) in 1990:Q3. During the 1999:Q2–2003:Q4 period, the real growth rate remained below 5.5 percent, falling as low as 2 percent (2003:Q1). However, since 2003, growth has accelerated, rising in nominal terms to 18.8 percent, the largest increase since 1983:Q4.

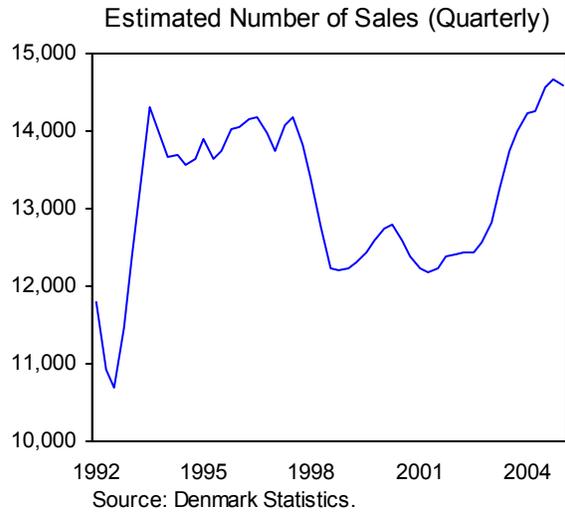
⁷ Prepared by Paul Hilbers and Robert Tchaidze. The contribution by François Haas to the section on the functioning of the Danish mortgage market is gratefully acknowledged.

⁸ The nominal index is provided by the Danish National Bank, while the real index is constructed from the nominal one by deflating it by the consumer price index (CPI).

Figure 1. Danish Housing Market: Developments in Real and Nominal Prices, 1975-2005



38. **Rapidly increasing prices have recently been accompanied by an increase in turnover.** Looking at the estimated number of sales of single-family houses (four-quarter moving average), one observes a “splash” lasting from 1994:Q2 to 1998:Q2 with the number of quarterly sales rising to more than 14,000 from about 11,000. This period follows the second boom-bust cycle, when in real terms, prices fell to a twenty-year low. After the prices started to rise again, turnover first decreased to about 12,500 sales per quarter. In 2004, turnover started to rise, reaching again more than 14,000 sales per quarter.



39. **House prices have generally moved in line with other relevant variables, but there has been a relative acceleration in recent years** (Figure 2). In particular, in the early 1990s, property prices were lagging GDP per capita, but towards the end of the period, they started to grow faster. As interest rates fell throughout the 1990s, property prices increased. At the same time, there seem to be some lags: interest rates had been falling already for a while before house prices picked up in 2004, and recently the decline in interest rates has stopped while house prices kept accelerating. Developments in the stock market have followed a similar general trend as house prices, with the exception of a swing in shares prices in the early 2000s which is not reflected in the property prices, and again in the most recent period when the stock price index declined. Finally, property lending has been moving roughly in line with house prices, albeit with varying leads and lags.

40. **Recent price increases also seem rather pronounced in comparison to rents and construction costs.** For these variables, the historical relationship with house prices in Denmark has been weaker. For instance, there does not seem to be a strong relationship with the rental rate, which is likely to reflect the fact that the rental market in Denmark is heavily regulated. Similarly, there is no close relationship with construction costs. Nevertheless, looking at recent developments it can be noted that house prices have strongly outpaced trends in rents and construction costs (see bottom panels of Figure 2). Also, OECD (2006) notes that house prices are currently high in comparison to construction costs, even though the ratio is not particularly high compared to what it is in some other countries.

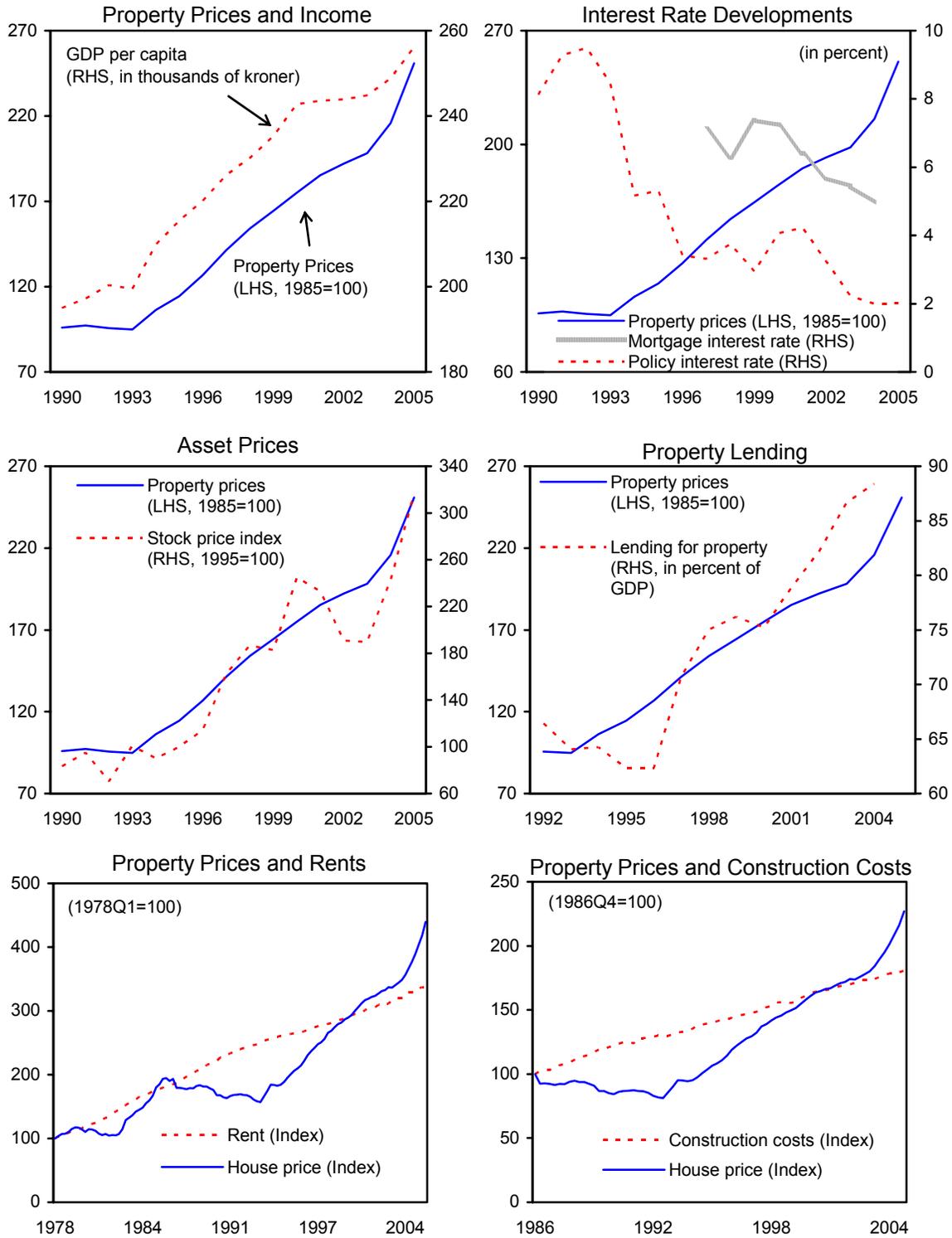
41. **Copenhagen has a special position in the Danish housing market, with a higher price appreciation and smaller additional supply.** In assessing house price developments in Denmark, it is important to keep in mind that about 30 percent of the population lives in the greater Copenhagen area. Copenhagen is the largest city in the Nordic region, and as most large European cities is more restricted in terms of building and land use than smaller cities and rural areas. As a result, supply has less room to react to demand, and prices in the Copenhagen region have appreciated more rapidly than in the other regions of Denmark, while the increase in the housing stock has been slow.⁹

42. **Finally, prices of summer houses have also been appreciating rapidly.** Summer houses are popular in Denmark, and there is a sizable market in these homes, in particular in the coastal areas. Prices of summer homes have been going up rapidly in recent years, despite the somewhat more limited financing options.¹⁰ However, recently the rate of appreciation has dropped below that for primary residences.

⁹ Based on data for the period 1995–2004; see OECD (2006).

¹⁰ Data from the Association of Danish Mortgage Banks. The loan-to-value ratio is limited to 60 percent, but mortgage loans can be topped up with housing loans provided by commercial banks.

Figure 2. Residential Property Market: Relevant Indicators



Sources: Bloomberg; DNB; Denmark Statistics; EMF; Eurostat; and Haver Analytics.

International comparison

43. **With a share of owner-occupied housing of about half, Denmark finds itself somewhere in the middle internationally.** Home ownership is lower than in most other Nordic countries (except Sweden) and in Anglo-Saxon countries, and higher than in, e.g., Germany and Austria. The remainder of the Danish housing stock is divided among social housing (about 20 percent), the private rental market (a bit below 20 percent), and cooperatives and employer provided housing (about 10 percent).

Home Ownership Ratios, 2004 (Share of Owner-Occupied Housing; in percent)	
Ireland	78
Belgium	71
United Kingdom	69
Norway	61
Finland	58
France	56
Denmark	52
Germany	43
Austria	42
Sweden	39
Switzerland	35

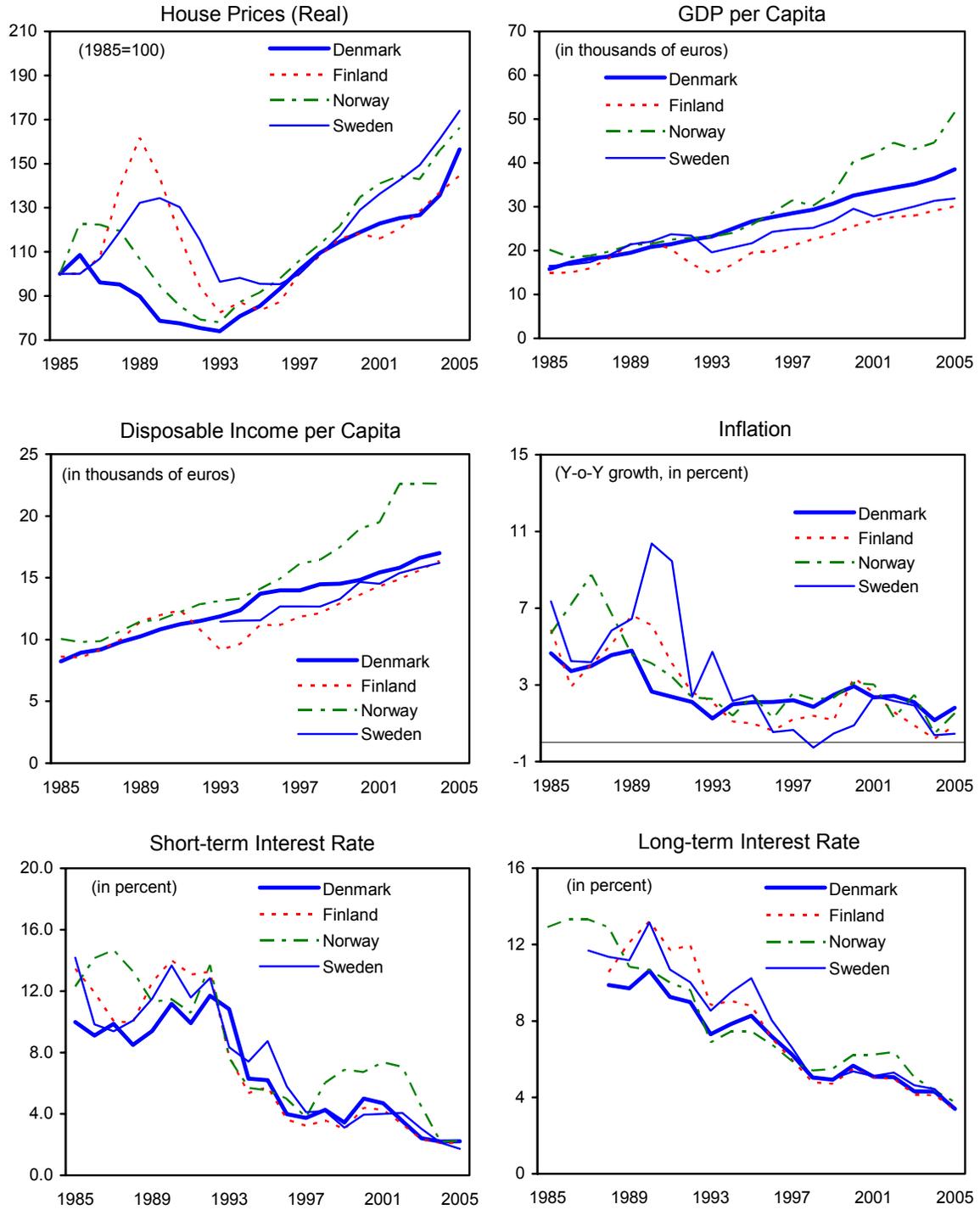
Source: OECD (2006).

44. **This section now compares developments in the Danish housing market over the last two decades to those elsewhere.** We compare developments in Danish house prices, as well as in key determining factors (income, inflation, interest rates), with those in other advanced European countries, divided into three groups—Nordic countries (Finland, Norway, and Sweden), large European countries (France, Germany, Italy, Spain, and United Kingdom), and other smaller European countries (Austria, Belgium, Ireland, and Netherlands). Figures 3–5 show developments in the real house price index, measurements of income (GDP and disposable income per capita), CPI inflation, and short and long-term nominal interest rates.

45. **Movements in Danish house prices have been less volatile than in other Nordic countries** (Figure 3). In particular, Finland and Sweden experienced rather dramatic boom-bust cycles in the late 1980s–early 1990s, while in Norway the peak was somewhat earlier and less pronounced. In Denmark prices peaked around the same time as in Norway but the increase was even smaller. The “bust” occurred around the same time in all of the countries, in 1993. The fall was the most pronounced in Finland where prices halved, while in Denmark prices fell by 32 percent. Markets recovered in 1996–7, and since then grew steadily, although at a faster pace in Norway and Sweden.

	Peak	Increase (1985-peak) (In percent)	Trough	Fall (Peak-trough) (In percent)
Denmark	1986	8.6	1993	31.9
Norway	1986	22.8	1993	36.4
Sweden	1990	34.5	1993	28.6
Finland	1989	63.5	1993	49.4

Figure 3. Denmark Compared to Other Nordic Countries, 1985-2005



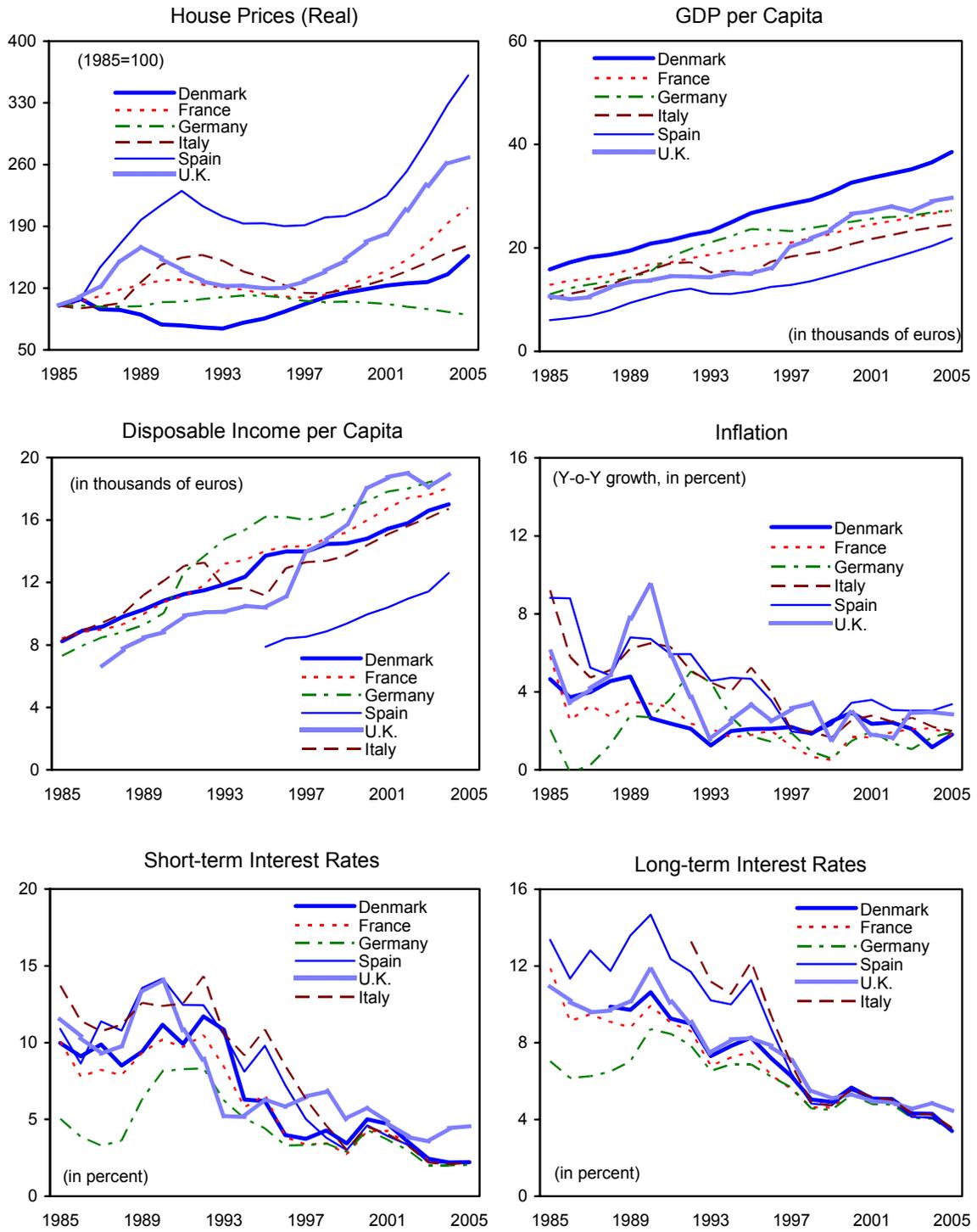
Sources: AMECO; BIS; Eurostat; IFS; and WEO.

46. **Developments in fundamentals in Denmark are comparable to those in other Nordic countries.** GDP per capita and disposable income per capita in Denmark grew at rates similar to those in Sweden and Finland, while in Norway these variables grew faster, boosted by oil revenues. Inflation in all of the countries has declined and dispersion among them has largely disappeared. The same is true for interest rates, although in the late 1990s and the early 2000s, interest rates in Norway were somewhat higher.

47. **During most of the period, Danish house prices developed roughly in line with those in many other European countries** (Figures 4 and 5). In many countries house prices accelerated in the late 1990s, with the exception of Germany and Austria where prices stayed flat and even declined somewhat toward the end of the sample. Denmark lagged behind, and prices did not start to catch up until the end, while remaining relatively flat (compared to other countries in these two groups) throughout most of the sample. Although GDP per capita in Denmark is higher than in other countries (with the exception of Ireland catching up at the end of the sample), disposable income per capita is much closer to that elsewhere in Europe, reflecting the heavier tax burden than in non-Scandinavian countries. Inflation and interest rates have converged at the end of the sample, except in the United Kingdom, where the short-term interest rates started to rise in 2004. Finally, Figure 6 shows that population growth in Denmark overall has been similar to that in most other European countries, with the exception of Ireland and Spain.

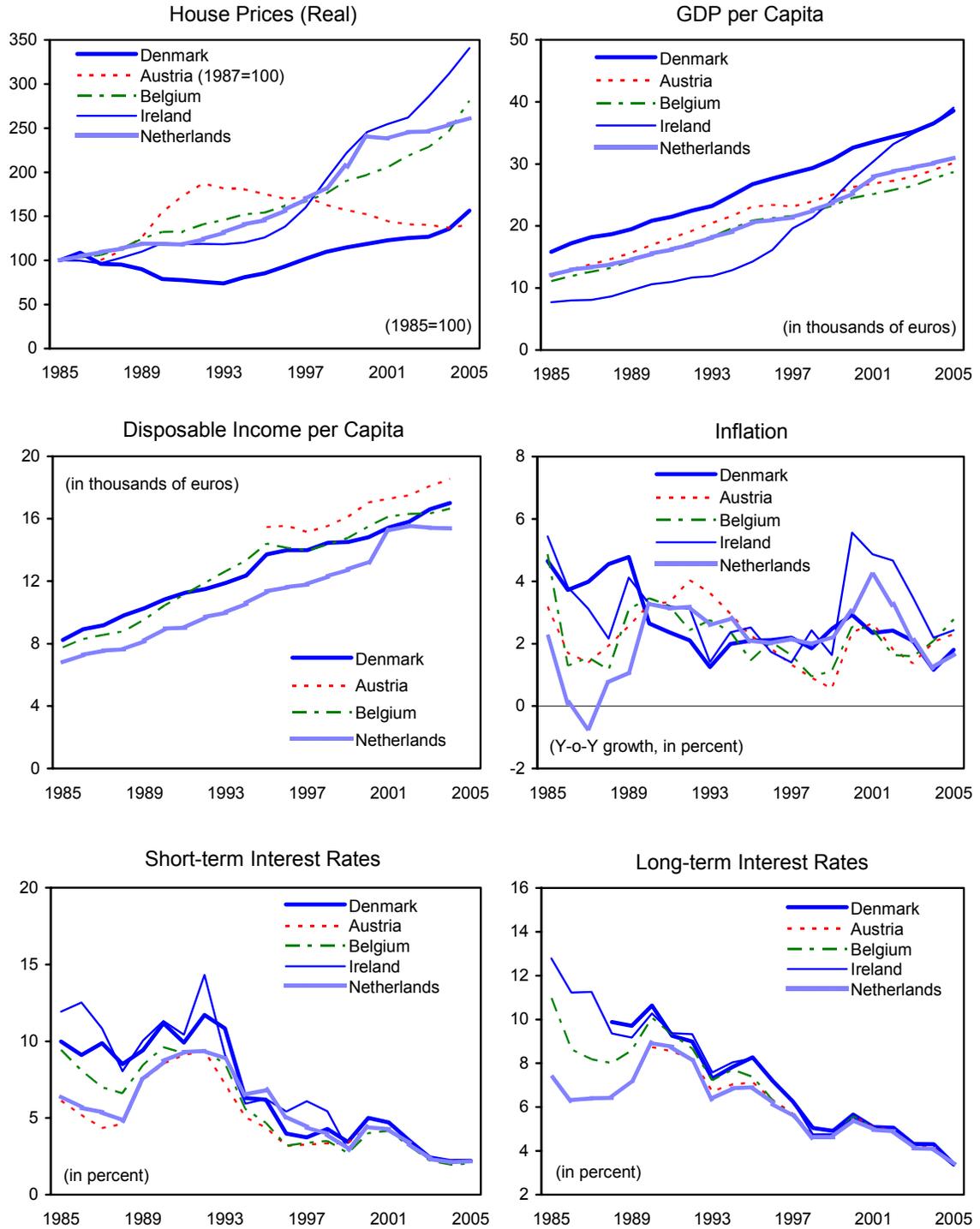
48. **However, Danish house price developments in 2005 were exceptional.** While until 2005, Danish house prices developed roughly in line with those in other Nordic countries and lagged somewhat behind those elsewhere in Western Europe, 2005 marked a growth spurt. The underlying factors in Denmark, however, were not that different from those elsewhere: even though GDP per capita in Denmark is higher than in non-Scandinavian countries, disposable income is not; inflation and interest rates have largely been converging and now are rather similar to those elsewhere; Denmark's population growth has been on the low side in comparison to other countries, which would explain a slower growth in house prices. All this indicates that the recent increase in house prices cannot be fully explained by general variables such as income, interest rates, and demographics, and should at least in part be attributed to other factors.

Figure 4. Denmark Compared to Large European Countries, 1985-2005



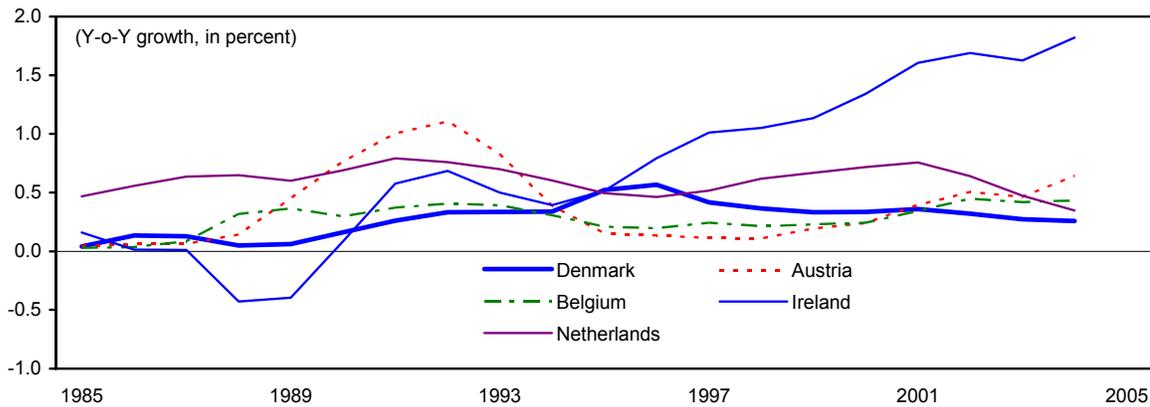
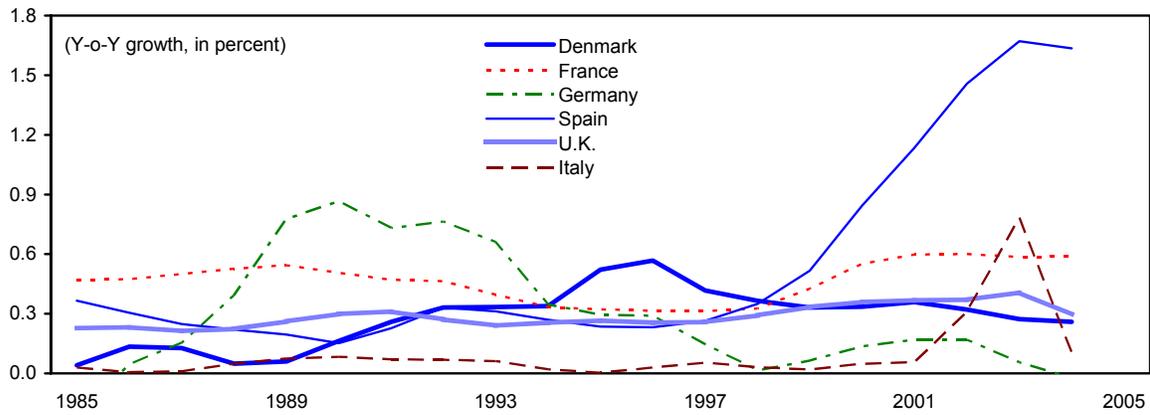
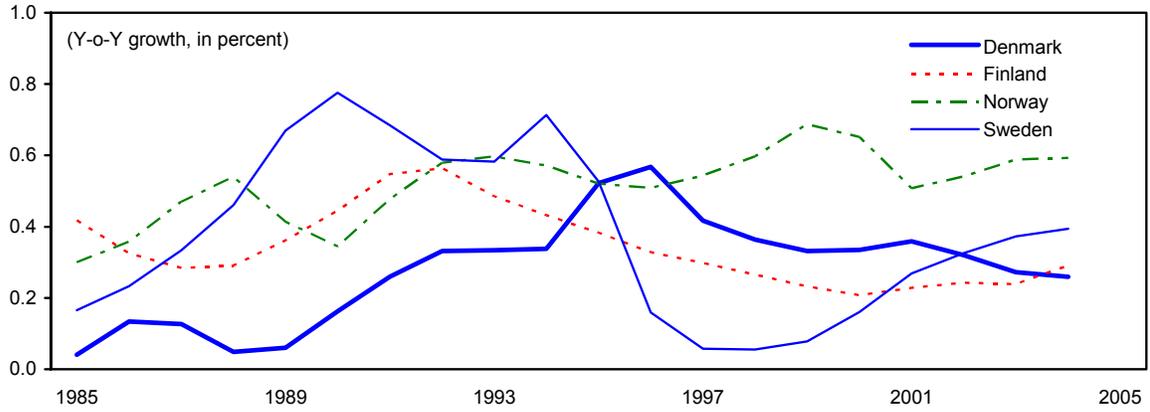
Sources: AMECO; BIS; Eurostat; IFS; and WEO.

Figure 5. Denmark Compared to Small European Countries, 1985-2005



Sources: AMECO; BIS; Eurostat; IFS; and WEO.

Figure 6. Population Growth: a European Comparison, 1985-2005



Source: Eurostat.

Empirical analysis

49. Below, we report on a tentative empirical analysis of developments in the Danish housing market over the past decades, based on the factors discussed above.

Data issues

50. **The empirical analysis is based on the quarterly nominal house price index provided by the Danish National Bank, deflated by using a consumer price index and renormalized.** The real index obtained this way is similar to the one reported by the BIS. To obtain real income, we use IFS estimates of gross disposable income, deflated using the CPI, and divided by the population or, alternatively, the number of households reported by Denmark Statistics. Real interest rates are constructed using CPI inflation and government bond yields as reported by the IFS. Data availability restricts the sample period to 1979:Q1–2005:Q4.

Modeling aspects

51. **For the empirical estimations, we follow the error correction model discussed in IMF (2003),** wherein quarterly real house prices respond to short- and long-term movements in house prices, real interest rates, and real income per capita. Specifically,

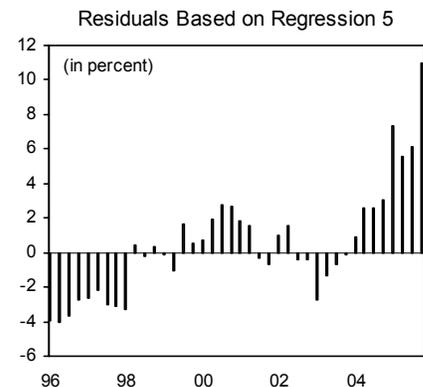
$$\log(P_t) = \beta_0 + \beta_1^{(-)} \cdot r_t + \beta_2^{(+)} \cdot \log(y_t) + \mu_t,$$

$$\Delta \log(P_t) = \rho \cdot \mu_{t-1} + \sum_{j=1}^k \gamma_{i,j} \cdot \Delta \log x_{t-j} + v_{i,t}$$

where the expected signs of the real interest rates, r , and output per capita, y , in the long-run equation are indicated in parenthesis, and μ_{t-1} , $\Delta \log x_{t-k}$ and v_t are the (once lagged) long-run error, lagged changes in the explanatory variables (grouped in a vector) and a white noise error term. The long-run or cointegrating equation yields a long-term relationship based on which it is possible to assess potential over(under)valuation. There are limitations to this approach: time series used are found to be serially correlated, and unit root hypotheses are hard to reject. Moreover, the estimation is complicated by structural breaks.

Estimation results

52. **The results are sensitive to the sample period and the choice of the lag structure.** We estimated several sub-samples (see below). Based on an estimated cointegrating relationship, we constructed the equilibrium values and compared them with the actual house price index through the



whole sample and in particular at the end of it (2005:Q4). The longer samples—in particular the ones that include the late 1980s—suggest that current house prices are below the equilibrium values; while the shorter samples, starting in the mid-1990s suggest a certain degree of overvaluation.¹¹ The results are not very different qualitatively if the income per household is used instead of income per capita. Estimations based on sub-sample 5 suggest that housing prices were the furthest below the “equilibrium” values in 2003:Q1 and caught up with them in 2003:Q4. Since then, according to this particular specification, the actual prices continuously exceeded the “equilibrium” values with the residual reaching 11 percent in 2005:Q4.

Sub-sample	Description	Lags	Constant	Income per capita	Real interest Rate	Residual in % in 2005:Q4
1. 1985:Q3–2005:Q4	The longest sample where estimated coefficients have expected signs	4	-6.28	1.58 (1.87)	-0.15 (-3.29)	-28.0%
2. 1986:Q1–1998:Q4	From the latest peak to recovery to the same level	4	-5.88	0.94 (1.44)	-0.13 (-4.40)	-20.8%
3. 1993:Q2–2005:Q4	From the latest trough onwards	4	-5.72	1.36 (2.83)	-0.08 (-4.23)	7.2%
4. 1993:Q2–2005:Q4	From the latest trough onwards	8	-5.34	0.51 (0.91)	-0.12 (-5.03)	10.5%
5. 1997:Q4–2004:Q2	Yearly real growth below 8 percent	6	-5.96	2.06 (36.28)	-0.02 (-5.83)	11.0%

53. **The estimates do not account for structural changes.** There are two important ones often quoted with respect to the Danish housing market: changes in housing taxation and the introduction of new types of mortgage loans. Some studies have tried to incorporate these qualitative factors; although their incorporation seems to improve the fit, they do not eliminate the residuals at the end.¹² Also, while the residual may largely disappear for a broad measure, it remains for specific regions such as the greater Copenhagen area.

¹¹ Overvaluation has been gauged in reference to the current values of the fundamentals in the model. In principle, the current value is the best long-run forecast of an integrated variable, such as those considered here.

¹² Wagner (2005) argues that about 5 percent of the increase in housing prices between 1993 and 2004 can be attributed to changes in property taxes, out of which 1 percent can be attributed to the tax freeze. However, the study still reported an unexplainable negative residual of some 10 percent.

C. The Role of the Financial Sector¹³

The institutions: mortgage banks

54. **The Danish mortgage system is generally recognized as one of the more sophisticated and efficient housing finance systems in the world.** Through the implementation of a strict balance principle, the system has proved very effective in providing borrowers with flexible, transparent, and low-cost (close to capital market conditions) funding. At the same time, as pass-through securities, mortgage bonds transfer market risk from the issuing mortgage bank to bond investors. Strict property appraisal rules and credit risk management by the mortgage banks have historically shielded mortgage bonds from default risk.¹⁴

55. **Mortgage banks (MBs) are specialized lenders restricted to conducting narrowly defined mortgage credit activities.** MBs are the only financial institutions allowed to grant loans against mortgages on real property by issuing mortgage bonds. Their scope of activities is limited to the origination and servicing of mortgage loans, their funding—exclusively through the issuance of mortgage bonds—and activities deemed accessory. They are not authorized—as commercial banks are—to fund their credit activity with deposits or issue guarantees, although they can develop banking and insurance activities through subsidiaries.

56. **The Danish mortgage system is highly concentrated and comprises mutual associations and public limited companies.** The system, which has a long history, has kept evolving over time. The last major round of reform took place in 1989, removing existing restrictions to the establishment of new MBs as public limited companies, and allowing commercial banks to own MBs. Currently, there are eight MBs, some affiliated with commercial banks, while others are operating on a stand-alone basis as foundations. While some institutions specialize in specific market segments, others cater to the entire spectrum of mortgage borrowers. The specialized lender principle and the progressive rationalization of the system explain the high degree of concentration of the Danish market, which in Europe is only matched by Sweden.

¹³ This section draws heavily on a note by François Haas, prepared in the context of the 2006 FSAP. See also Frankel and others (2004), DFSA (2005), and DNB (2006) for details on the Danish Mortgage Industry.

¹⁴ For the potential implications of the recent European legislation with regard to covered bonds for the functioning of the Danish mortgage market, see the 2006 Financial System Stability Assessment for Denmark.

Concentration in EU Mortgage Markets

Country	Mortgage Market Share of the Five Biggest Lenders, in percent (2003)
Denmark	95
France	75
Germany	45
Italy	65
Netherlands	75
Spain	50
Sweden	95
United Kingdom	60
Czech Republic	80
Hungary	70
Poland	80

Sources: ECB, Mercer Oliver Wyman and others (2003), and London Economics (2005).

57. **The market is rather concentrated, with competition taking place largely through redistribution channels, although commercial banks have recently become more active.** Access to distribution channels is critical and is likely to be increasingly important. MBs compete in a tightly regulated environment. The specialized nature of MBs and the largely standardized nature of mortgage products in Denmark result in competition for market shares through distribution and product development. MBs often do not have their own distribution networks but offer their products through a range of distribution channels (commercial bank branches, agreements with realtors, etc.). In recent years, the commercial banks have become more active in the housing market themselves, in direct competition with MBs, which has added to the overall level of competition.¹⁵

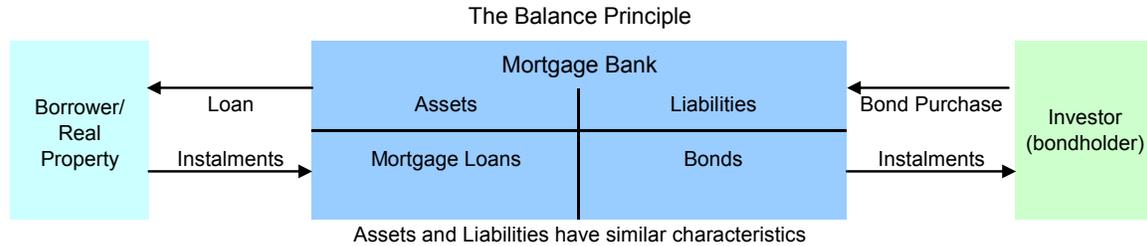
The balance principle

58. **The balance principle imposes strict matching rules between the assets (e.g., mortgage loans) and the liabilities (mortgage bonds) of MBs.**¹⁶ Each new loan is funded by the issuance of new mortgage bonds of equal size and identical cash flow and maturity characteristics. The proceeds from the sale of the bonds are passed to the borrower and,

¹⁵ For a more general discussion of the structure and activities of Danish commercial banks, see the 2006 Financial System Stability Assessment for Denmark.

¹⁶ Strict rules also apply to the MBs' capital base. The strict matching requirements imposed on individual loans and bonds were somewhat relaxed with the amendments to the Mortgage Credit Act in 2000. These introduced specific requirements with regard to aggregate risks (interest rate, liquidity, exchange rate and counterparty risks), thereby allowing for enhanced product innovation while maintaining tight asset and liability management constraints.

similarly, interest and principal payments are passed directly to investors holding mortgage bonds.



59. **The prepayment of mortgage loans results in a proportionate redemption of mortgage bonds, and remortgaging results in the issuance of new bonds.** Within MBs, mortgage pools and the corresponding bonds can be segregated in different “capital centers,” each with its own reserve fund, and ring-fenced from the rest of the institution.

60. **The balance principle allows borrowers to benefit from attractive funding rates.** By essentially limiting the role of MBs to bringing together mortgage borrowers and mortgage bond investors, the system allows the former to benefit from financing conditions close to those that prevail in capital markets (for the type of loan they request and at the time the borrowing takes place). The service provided by the mortgage institution is paid for by borrowers through front-end and annual administrative fees. This annual contribution paid by borrowers covers the interest margin of the MB. It usually represents about 0.5 percent of the remaining debt.

61. **The risk assumed by MBs is largely limited to credit risk.** This is actually a combined risk: the risk that the borrower defaults and the risk that the value of the property does not match the outstanding amount of the loan. New types of mortgage loans are changing the way credit risk is incurred by mortgage banks: with deferred amortization loans, credit risk is higher, since repayments are postponed to a future date.

Strict lending rules

62. **The strict lending rules imposed by the Mortgage Credit Act differ depending on the type of property financed.** Maximum loan-to-value ratios and lending periods are set up for each category of property. While for all categories of properties, the maximum lending period can be up to 30 years (and up to 35 years for cooperative homes), maximum lending limits differ significantly according to the nature of the mortgaged property. For owner-occupied homes, rental properties, cooperative homes and housing projects, mortgage loans can represent up to 80 percent of the value of the property. In contrast, maximum loan-to-value ratios are limited to 70 percent for agricultural properties, 60 percent for commercial

real estate and secondary residences (summer homes), and 40 percent for unbuilt sites.¹⁷ In addition, a change in the purpose of a mortgaged property and the transfer of a property to another property category can result in changes in the characteristics of the mortgage loan.

63. **In assessing the “mortgageable” value of properties, MBs are expected to adopt a conservative approach.** The key principle is that the estimated value should fall within the amount that an experienced buyer with knowledge about price and market conditions for that type of property would be deemed to be willing to pay. In particular, when assessing the market value of the property, the risks of changes in market conditions, as well as in the structural conditions of the property, shall be taken into account, whereas factors that result in a particularly high price shall be discarded. The property serving as collateral must be valued on sight. However, following this initial assessment, mortgage lenders are not required to periodically mark-to-market the value of the properties backing their loans.

Registration and foreclosure

64. **Effective land and mortgage registration are key elements contributing to the well-functioning of the Danish mortgage system.** Denmark maintains three registers of real properties. The cadastre is the basic register and gives a specific identification number to each land parcel. This unique title number is then used by other registers, in particular the Land Registry (Book). The Land Book registers all rights attached to each property and is therefore the legal register providing safe titles and securing private rights. It is only when a mortgage has been finally and correctly registered in the Land Book that the mortgage bank can grant a loan without any other type of security. The Land Book is administered by district courts, under the responsibility of the Ministry of Justice. Lastly, the Municipal Register of Real Properties gathers data on the valuation of land parcels and buildings, and is mainly used in the collection of land taxes.

65. **Speedy forced sales and repossession procedures add to the efficiency of this framework.** In the event of nonpayment of mortgage-related obligations by the mortgagor, the mortgage bank may put the property up for a forced sale. Forced sales are carried through by enforcement courts, which are part of the ordinary system of courts. Mortgagees will be covered in order of priority, and, while uncovered mortgage loans will be deleted from the Land Book, the mortgagees will keep their (uncovered) claim against the borrower as a personal claim. It typically takes no more than six months from the time the borrower defaults on the loan until a forced sale can be carried through.

¹⁷ As the Danish corporate structure is dominated by SMEs that do not have access to the corporate bond market, mortgage loans are frequently used by the corporate sector to finance its activities.

The supervision of mortgage banks

66. **The supervision of MBs reflects their specific risk profile.** MBs are supervised by the Danish Financial Supervisory Authority (DFSA), which combines the general risk-based approach used for all banking institutions with a specific focus on the framework set up by the Mortgage Credit Act. In the assessment of financial institutions, the DFSA distinguishes between the general risk inherent in the type of institution and the specific risk associated with a particular institution. In contrast with commercial banks, which are assumed to have a “high general risk,” MBs are considered as “average general risk” institutions, thanks to the various legal and regulatory limitations placed on the risks they are allowed to assume.

67. **The specific risk of each institution is estimated by the supervisor’s internal rating system.** Through ratios related to solvency, growth in loan portfolios, and the evolution of market risks, the rating system helps determine the intensity of supervision applied to each institution. Regarding MBs, indicators based on the issuance of mortgage bonds and the origination of loans help assess how institutions implement the requirements of the balance principle. The analysis of loans granted by type of properties and comparative reports on late payments and losses allow close monitoring of the development of credit risk within the different MBs. Specific on-site inspection programs focusing on such key aspects as property valuation practices complement the off-site supervisory work.¹⁸

The market for mortgage financing in Denmark

68. The balance principle and the tight regulatory framework for MBs have not prevented the broadening of the range of mortgage loans available to borrowers and the corresponding diversification of mortgage bonds available to investors.

The product side: mortgage loans

69. **Fixed-rate callable annuity loans remain the dominant mortgage loans,¹⁹ although new types of loans have appeared since the mid-1990s.** These new loans came up in response to changing demands from both borrowers and investors. Key new products included:

- **Adjustable-interest rate loans.** These were (re)introduced in 1996, with long maturities up to 30 years.²⁰ The associated mortgage bonds have a shorter maturity than the corresponding loans. The entire remaining debt, or a specific fraction of it, is

¹⁸ The DFSA uses its own evaluation teams.

¹⁹ It should be noted that, unlike in e.g. the United States, there is no obligation to repay the loan when the underlying property is sold.

²⁰ See also Frankel and others (2004).

refinanced at periodic intervals. At the time of the refinancing, the interest on the loan is adjusted to the market level. Adjustable interest loans can also be granted in a series of instalments over a specified number of years.

- **Interest-only (no amortization) loans.** Loans with an instalment-free period of up to 10 years (interest-only loans) were introduced in the fall of 2003, both as adjustable-interest loans and fixed-rate loans, and have developed rapidly since.
- **Capped loans.** Mortgage loans with interest rate guarantees (which come at a premium) were introduced in the fall of 2004, in two main forms:
 - (i) floating-to-fixed loans, where the conversion takes place when the 6-month CIBOR rate reaches the cap, and the rate then remains fixed even if the market rate later declines; and
 - (ii) capped-floater loans, where the interest rate is reduced if the rate later declines again.

70. **The risks of these new instruments for MBs are limited, but it is elevated for borrowers and end-investors.** Thanks to the balance principle, these new types of loans do not result in additional large funding or liquidity risk for the MBs. However, some of these loans (interest-only loans in particular) may prove more risky for borrowers, and this may further strain the repayment ability of residential as well as corporate borrowers, potentially contributing to a more general increase in nonperforming loans when the credit cycle deteriorates.

71. **The growing appetite of Danish mortgage borrowers for variable rate loans in recent years is not unique, but corresponds to a trend witnessed throughout Europe and in the United States.** Mortgage loans with interest rate fixation periods of less than one year have gained ground in most European countries where mortgage loans are traditionally fixed-rate loans. In Denmark in particular, their estimated market share grew from about 4 percent to 22 percent between 1999 and 2003.

72. **A distinctive feature of the Danish mortgage market is the call and delivery option.** These call and delivery options, which are embedded in standard Danish mortgage loans, enable a borrower to prepay or buy back his loan at any given time, at par or at the prevailing market price. Outside Denmark, practically only the U.S. fixed-rate mortgage contracts offer borrowers a penalty-free (i.e., other than administrative fees) prepayment option, although no delivery option.

73. **Fixed-rate mortgage loans can be granted as callable or noncallable loans.** Callable loans may be prepaid, at par, before maturity, either on a payment date or “at once”

(i.e., before the next payment).²¹ Adjustable-interest rate loans (and index-linked loans) are always noncallable and can only be redeemed at par at the time of the adjustment. Like other mortgage loans, they can, however, be prepaid at any time by delivering the underlying bonds. In a high interest rate environment, the borrower can cancel his loan by buying back equivalent bonds in the market, instead of being forced to prepay and incur a loss. Furthermore, when rates are high, buying back the loan (below par) and refinancing into another loan/bond closer to par allows for capital gains, in return for accepting larger coupon payments. In practical terms, this means that the mortgagor buys back “his” bonds in the market and delivers them to the mortgage credit bank, which will then cancel the loan.

74. These options and the increased variety of mortgage loans have contributed to an increase in remortgaging activity in the recent period of declining long-term interest rates. In periods of falling interest rates, remortgaging into a new loan with a lower nominal interest rate will result in a gain in the form of lower future net payments, usually, however at the price of an increase in the overall outstanding debt. Conversely, at a time of rising long-term interest rates, redeeming an existing loan at a lower market price and refinancing into a new loan will achieve a reduction in outstanding debt, at the price of higher future interest payments. The strategy is ultimately profitable if interest rates decline again in the not-too-distant future, allowing for another remortgaging operation to a lower-coupon debt.

75. The introduction of adjustable interest rate loans has expanded the range of remortgaging strategies. In a steepening yield curve environment with rising long-term rates, borrowers holding a fixed-rate callable mortgage loan can refinance into shorter variable-rate mortgage loans and reduce their outstanding debt. Conversely, in a flattening environment with declining long-term rates, holders of variable-rate mortgage loans will be inclined to refinance into long-term fixed mortgages. The growing sophistication of advisory services at MBs has led to the more systematic monitoring of remortgaging opportunities for their customers and contributed to remortgaging activity in recent years. However, products such as capped loans are likely to lead, ultimately, to a decline in remortgaging over the longer term.

76. The Danish mortgage system offers a higher degree of completeness than most other European housing finance markets. Market completeness can be evaluated against a series of criteria, in particular the variety of mortgage products available to potential borrowers, market access (i.e., the range of borrowers who effectively have access to mortgage products), the distribution of products, and the availability of information and advice on mortgage products. Based on these criteria, a 2003 Mercer Oliver Wyman and

²¹ Since bond investors are entitled to their coupon payments until the next payment date, the borrower will have to prepay the full coupon. The borrower will, however, be compensated for making the funds available to the credit institution before the payment date, at a rate close to the prevailing money market rate.

European Mortgage Federation study ranked the Danish market third out of a sample of eight European markets.²² Other surveys have confirmed the high completeness level of the Danish mortgage market.

Availability of Mortgage Products
(WA: widely available, LA: limited availability, NA: not available)

	Availability of Mortgage Products			Mortgage Product Availability to Nonconforming Borrowers		
	Max. (average) LTV	Interest Only Loans	Equity Release Mechanism	Senior (more than 50 years)	Credit-Impaired	Self-Certified Income
Belgium	125 (75)	WA	NA	WA	LA	WA
Denmark	80	LA	WA	WA	WA	WA
Finland	(65)	NA	WA	WA	LA	WA
France	100 (80)	LA	NA	WA	NA	WA
Germany	80 (70)	LA	NA	WA	NA	LA
Italy	80 (55)	WA	NA	WA	LA	LA
Netherlands	125 (90)	WA	WA	WA	LA	WA
Spain	80 (65)	WA	LA	WA	LA	LA
Sweden	(75)	WA	WA	WA	LA	WA
United Kingdom	130 (75)	WA	WA	WA	WA	WA

Sources: London Economics Survey; Mercer Oliver Wyman and MITA (2005); and IMF staff calculations.

D. Taxation of Housing

77. **Property tax rates in Denmark differ depending on the value of the property.**

The rate for the property tax (*ejendomsvaerdiskat*), which was introduced in 2000 to replace imputed rent taxation,²³ equals:

- 1 percent for houses valued at up to DKR 3 million (about €400,000); and
- 3 percent over any additional value.²⁴

The rates are lower (0.8 percent and 2.8 percent, respectively) for properties acquired before July 1998, and the rates drop further to 0.4 percent and 2.4–2.8 percent for pensioners. It needs to be noted that in addition to the (state) property tax, municipalities impose a so-called land tax (*grundskyld*), which varies between 0.6 and 2.4 percent of the land value, while counties—and after the reorganization of local governments, the municipalities—can levy an additional 1 percent land tax.

²² Denmark, France, Germany, Italy, the Netherlands, Portugal, Spain, and the United Kingdom.

²³ The tax on imputed rent was based on a 2 percent return on the tax-assessed value (6 percent for values above DKR 2.15 million).

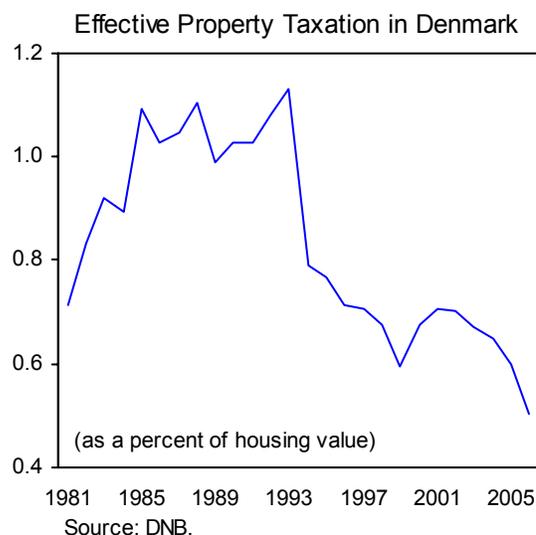
²⁴ Source: International Tax Handbook 2005.

78. **Taxable property values have been frozen since 2002.**²⁵ The value to be applied to determine the tax obligation on Danish properties²⁶ is the lowest of:

- the assessed value on January 1 of the current year;
- 105 percent of value at the beginning of 2001; and
- the assessed value at the beginning of 2002.

Given recent house price developments in Denmark, the system implies that the taxable value is essentially frozen at the level of 2002. As a result, the revenues from the real estate tax (excluding land taxes)²⁷ have been roughly stable in nominal terms since that year. Revenues amounted to about DKR 11 billion (0.7 percent of GDP) in 2005. Since on average house prices have increased by about 40 percent since early 2002, the system results in a large and increasing undervaluation of the taxable base. The Economic Council has calculated that without this freeze, but using the same tax rates, revenues would have been DKR 4 billion (0.3 percent of GDP) higher.

79. **As a result, the effective property tax rate keeps coming down.** The OECD estimates that the effective rate paid in 2006 is 0.55 percent of the assessment value (this lower rate includes both the impact of undervaluation and the lower tax rates for properties acquired before July 1998). The DNB has calculated that the effective property taxation (excluding land taxes) has already been coming down for a longer period (see chart). Over time, the effective rate will come down further if house prices keep increasing in nominal terms (even though the share of pre-1998 properties will come down, which will have an upward impact). Thus, the effective rate will also fall



²⁵ Land values are not frozen in this manner, and for the land tax, the current assessed land value remains the basis. However, there is a ceiling in terms of the rate of increase that can be applied. In addition, the land tax rates cannot exceed their average levels in 2002 in the context of the tax freeze. Pensioners have the right to postpone payment of land taxes until the house is sold.

²⁶ For foreign property the market value at the beginning of each year is used as a basis for taxation. Owners in cooperatives are exempt from the real estate tax (but also cannot deduct mortgage interest payments), while pension funds investing in rental housing are subject to a 15 percent rate on the returns, which is lower than the 28 percent corporate tax rate.

²⁷ Land taxes have roughly been stable as a share of GDP and exceed revenues from the real estate tax.

further behind the effective tax rates applied to alternative financial investments.²⁸

80. Interest payments are tax deductible, but the rate at which they can be deducted has fallen. The gradual decline in the tax rate on capital income in the 1980s and 1990s, implicitly also lowered the rate at which interest expenses could be deducted. The tax reform for the period 1998–2002 reduced the rate at which interest paid could be deducted further from a maximum of 46 percent (1998) to 33 percent (2002).²⁹ The rate has been stable since.

81. Denmark does not have a wealth tax and excludes primary residences from capital gains taxation. While the other Nordic countries have a wealth tax, Denmark—like most other European countries—does not (Table 1). It does levy a capital gains tax, but primary residences are excluded. About half of the European countries—including Finland, Norway, and Sweden—do have a form of capital gains taxation, in particular if properties are sold within a small number of years. Denmark does tax inheritances, like most countries, and the rates applied are relatively high.

82. Taxation of housing transactions is relatively low, and as a result, overall transaction costs are low as well. In a recent survey among European countries conducted by the European Mortgage Federation, Denmark ended up at the low end, with transaction costs of slightly more than 3 percent. Transaction costs elsewhere in Europe can add up to more than 10 percent, in particular as a result of high taxes; on average, taxes account for more than two thirds of transaction costs. Denmark's efficient housing finance system also helps keeping the costs of transactions low.

83. Overall, the element of Danish housing taxation that internationally stands out most seems to be the frozen valuation applied to property taxes. International comparisons of housing taxation levels are hard to make and would require a more detailed analysis. However, when comparing the various elements of housing taxation in Denmark internationally, the use of 2002 values to determine property taxes, is clearly an unusual feature. Even though regimes to slow down the increase in housing tax liabilities in an environment of rapidly appreciating house prices are not uncommon elsewhere, the freezing of taxable property values under the overall tax freeze in Denmark stands out, and if continued will result in an increasing stimulus to the housing market.

²⁸ OECD (2006, p. 96). The DNB estimates that the effective property tax rate (excluding land taxes) will reach 0.5 percent in 2006.

²⁹ This applies to individuals with negative net capital income. On positive net capital income, the top rate is 59 percent.

E. Concluding Remarks

84. **Recent house price increases in Denmark are not just driven by income and interest rates.** After a period of relatively modest increases, the Danish housing market has seen very rapid price hikes in recent years, and this process has still to see a significant slowdown. This study shows that a broad set of factors is likely to have contributed to the increase in house prices. Until recently, the pace of appreciation could largely be explained by general factors, such as increases in real disposable income and declines in interest rates. These, however, fail to explain the most recent acceleration of house prices. Two additional Denmark-specific factors are likely to have played a role here: developments in the housing finance market and in the Danish taxation of housing.

85. **New products developed in the mortgage market have supported demand.** The Danish mortgage financing system is very flexible and has benefited from an array of new products. The system, which shares certain characteristics with the U.S. system in terms of easy refinancing options and an active mortgage-linked securities market, is also very efficient, resulting in low transaction costs. This implies that upward demand pressures easily translate into price increases. In addition, a number of new products were launched in recent years, including flexible-interest loans and interest-only loans. These products, because of their (initially) lower servicing costs, have increased the amounts that could be borrowed, in particular for second mortgages. All in all, the Danish mortgage market is a very efficiently functioning market, which provides borrowers with relatively flexible and low-cost funding options; as such, it has certainly facilitated the rapid increase in house prices in recent years.

86. **The tax regime for housing has provided additional support for the housing market in the past period.** Under the general tax freeze, not only the property tax rates applicable to housing have been frozen, but also the underlying values to be applied; these values have basically been frozen at their 2002 levels. Thus, the sharp increase in house prices since 2004 has not resulted in any increase in the real estate taxes due. The rapidly decreasing effective property taxation provides a stimulus to the housing market.

87. **Careful monitoring will be required.** The impact of financial innovations and the tax regime are hard to estimate empirically, which makes it also difficult to assess whether an imbalance is developing. But the current situation requires close monitoring by the authorities, the strict application of supervisory rules and regulations by the supervisor, and continued campaigns to raise public awareness of the risks involved in overborrowing.

Table 1. Housing-related Taxation: Summary Information for the Nordic Region

	Personal Income Tax			Property Tax		Capital Gains Tax	Wealth Tax	Inheritance and Gift Taxes	
	Rental Income Taxable?	Imputed Income for Owner Residence?	Deductions? Mortgage Interest	Property Tax	Is Real Estate Taxed?	Average Rate (Unweighted)	Are Capital Gains Taxable?		
Denmark	Yes.	No.	Yes.	Yes, for rental income.	Yes. The taxable value of property in Denmark is the lowest of (1) the assessed value of 1/1 of current tax year, (2) 105% of the accessed value of 1/1/2001, and (3) the accessed value of 1/1/2002. There is also a land tax.	The rate is 1% of the taxable value up to DKr 3,040,000 and 3% on any excess. The rates are reduced to 0.8% and 2.8% if the property was acquired before 7/1/1998. For most types of property, rates are further reduced to 0.4% and 2.4%, with a max. DKr 1,200 for the latter deduction.	Yes. But gains on the sale of owner-occupied dwellings are normally exempt. The capital gains are included in taxable income (capital income) and levied at the personal income tax rate.	No.	Yes.
Finland	Yes.	No.	Yes.	Yes, for rental income.	Yes.	For residential buildings, the rate may vary between 0.22% and 0.5%. A rate of 1% to 3% may be levied on unbuilt building sites.	Yes, if the sale of the immovable property (used as permanent residence) is within two years of acquisition. The capital gains are levied at a rate of 28%.	Yes. No tax is due if under €250,000. The tax is €80 on a net wealth of €250,000 and 0.8% on the excess.	Yes.
Norway	Yes, but rental income from primary residence is exempt.	No, abolished in 2005.	Yes.	Yes, for rental income.	Yes. The tax base is 20%-50% of the fair market value.	Rate varies between 0.2% and 0.7% depending on the municipality.	Yes. Capital gains are taxable (at PIT rate) with some exemptions and special provisions.	Yes, both national and municipal net wealth tax. Personal property up to Nkr 100,000 is exempt. The average rate is 1.0%.	Yes.
Sweden	Yes, taxed as capital income; 20% of rental income is deductible and so is the standard deduction of SKr 4,000.	No.	No.	Yes, for rental income.	Yes. The tax base is the assessed value of the property, 75% of its market value if the property is located abroad.	New buildings are exempt for the first five years; for the next five years, the rate is reduced by 50%. The tax rate is 0.5% for industrial property and rental apartments and 1% for commercial premises and private dwellings.	Yes. There is rollover relief. For private dwellings, other than those qualifying for the tax deferral, including vacation houses, two-thirds of the capital gains are taxable at a flat rate of 30%.	Yes. The aggregate family net wealth is subject to tax at the single rate of 1.5% on the amount exceeding SKr 1.5 million (3 million for those filing jointly).	No, abolished on 1/1/2005. It is also retroactive to 12/17/2004. Previously, 30% imposed by the state.

Source: *European Tax Handbook*, 2005.

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