Denmark's fixed exchange rate regime and the delayed recovery from the Global Financial Crisis: A comparative macroeconomic analysis

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Denmark's fixed exchange rate regime and the delayed recovery from the Global Financial Crisis: A comparative macroeconomic analysis*

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Abstract: This paper compares Denmark's growth performance to that of the other 18 non-Eurozone OECD economies during 2008-12. Denmark is the only country with a fixed exchange rate regime; the other 18 countries all have flexible exchange rates, mostly as part of an inflation-targeting framework. At the same time, Denmark is one of the worst growth performers during 2008-12. Our analysis indicates that the lack of monetary policy independence is central to understanding the meager Danish performance. Aggressive monetary policy during 2008-09 is an important predictor of economic growth during 2008-12; and Denmark, having outsourced monetary policy to the ECB, did not pursue monetary easing as aggressively as most other countries. Overall, the analysis suggests that had Denmark been able to follow Sweden in aggressively cutting interest rates in the wake of the Global Financial Crisis, it would have added three quarters of a percentage point to average annual real GDP growth during 2008-12.

1. Introduction

What to choose: A fixed or a floating exchange rate regime? A main problem with staking too much of the argument in favor of a particular exchange rate regime on the two to three decades prior to the 2008 Global Financial Crisis (GFC) is that the different regimes have not really been tested in earnest. In fact, it is exactly in the aftermath of a major shock that the fixed versus floating distinction should matter the most.

Consider, e.g., the case of Sweden vs. Denmark. Sweden has since 1992 had a floating exchange rate, whereas Denmark since 1982 has adhered to a fixed exchange rate regime. The immediate Swedish response to the GFC illustrates the difference. The Swedish central bank significantly lowered policy interest rates, which led to currency depreciation, improved competitiveness, and ultimately an increase in exports (OECD 2011).[1] In Denmark, on the other hand, an autonomous response to the GFC was precluded by design.

When a country has a fixed exchange rate, it has to follow the monetary policy of the country to which its currency is pegged—or if it is part of a currency union, it has to rely on a concerted effort by the countries in the union. This leads to a fundamental problem with monetary policy under fixed exchange rates, namely "when one size does not fit all" (Nechio 2011). For example, simple Taylor-rule recommendations for the Eurozone as a whole have been broadly consistent with ECB monetary policy, but it is less clear whether this policy was also appropriate for the individual Eurozone economies and for the countries (including Denmark) that have a fixed exchange rate vis-à-vis the Euro.

The Danish case is very illustrative. By the fall of 2005, the first signs of "overheating" were beginning to show in Denmark (OECD 2005). Yet, monetary conditions appropriate for the Eurozone as a whole were providing stimulus to the Danish economy. By the spring of 2006, when the economy was clearly overheated, monetary policy was still adding fuel to the Danish economy (OECD 2006). Hence, the OECD recommended that fiscal policy should be tightened, and it stressed the urgency of increasing labor supply, both by strengthening work incentives and by making it easier for foreigners to enter sectors like construction. The Danish government did not comply. At this juncture, the obvious policy response would have been an interest rate increase by the central bank—as clearly recommended by a simple Taylor rule for Denmark

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[1] The SEK currency move also reflected tensions in global interbank markets, which affected Swedish banks with large dollar liabilities and thereby depressed the SEK by forcing USD buying and SEK selling; see, for example, Nomura Securities (2009).

(OECD 2008)—but such a unilateral policy response was of course impossible.[2]

This present paper investigates the extent to which blame for Denmark's deep and prolonged economic crisis can be directed at the fixed exchange rate regime. The approach adopted in the paper simply entails paralleling Denmark's growth performance during the Great Recession and beyond (2008-12) with the 18 non-Eurozone OECD countries. Restricting attention to OECD countries makes sense, as these countries are very good comparators for each other (Aizenman and Pasricha 2013). Second, data quality for OECD countries is superior (often by a wide margin) to data quality for other groups of countries.[3] Third, as the Eurozone sovereign debt crisis was fueled by a self-fulfilling panic—see De Grauwe and Ji (2013) for a very convincing demonstration of this—it makes sense to exclude the Eurozone.[4] This leaves us with a sample of 19 non-Eurozone OECD countries, among which Denmark is the only country with a fixed exchange rate regime. Sixteen countries had an inflation-targeting (IT) regime with floating exchange rates, while Japan and the United States floated without IT. That is, the remaining 18 countries were—unlike Denmark—free to pursue an independent monetary policy when the GFC erupted in earnest in 2008. Of course, these 18 countries could also use monetary policy prior to the crisis in order to better soothe their respective business cycles.

This paper is related to a broader debate going back at least to Friedman's (1953) seminal paper on fixed versus floating exchange rates; see Tavlas et al. (2008) for a survey of the classification and performance of alternative exchange-rate systems. Recent empirical contributions include de Carvalho Filho (2010), Ghosh et al. (2014), Andersen et al. (2014), and Rose (2014). Combining developed and emerging economies, de Carvalho Filho explores the implications of inflation targeting with flexible exchange rates for various economic indicators using data for the period 2006-09. He finds, among other things, that IT countries had higher GDP growth. Ghosh et al. note that it is unclear why hard pegs (the least flexible regime) should be equally resilient to crises as free floats (the most flexible regime). Analyzing more than 50 emerging-market economies during 1980-2011, they find that free floats are in fact the least vulnerable to crises, whereas hard pegs exhibit some of the greatest vulnerabilities. In particular, the latter are

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[2] See Ravn (2012) for an analysis of whether the Danish interest rate has followed the rate prescribed by a Taylor rule for Denmark in the period 1994-2009.

[3] For an informative discussion of data quality in an emerging market context, see Jerven (2013).

[4] The Eurozone's sovereign debt crisis exploded in May 2010 and only stabilized during the summer of 2012 when Mario Draghi pledged to do "whatever it takes to preserve the Euro." This also testifies to the self-fulfilling nature of the Eurozone crisis. The notorious speech by ECB President Mario Draghi was delivered on 26 July 2012 in London.

more prone to growth declines and delayed adjustments. Analyzing the sample of all countries for which data are available, Andersen et al. (2014) also show that countries with inflation targeting and flexible exchange rates grew faster than countries with hard pegs during 2008-12. Finally, Rose (2014) explores the growth consequences of monetary regimes during 2007-11, but he does not find a positive effect on growth of IT and flexible exchange rates compared to hard pegs. However, the reason for this "non-finding" is that Rose does not employ the (conditional) growth regression framework (see Andersen et al. 2014). Instead, he compares (unconditional) time-demeaned growth rates across regimes.

The paper is structured as follows: Section 2 considers the comparative macroeconomic performance during 2008-12 of Denmark and the non-Eurozone OECD countries somewhat informally. The discussion in Section 2 leads naturally to Section 3, which contains a more formal multivariate regression analysis. Section 4 looks at the link between monetary policy, house price misalignments, and growth during 2008-12. Finally, Section 5 offers some concluding remarks.

2. Comparative macroeconomic performance, 2008-12

In its 2009 Economic Survey of Denmark, the OECD (2009, p. 18) notes that the crisis in Denmark "is proving less painful than in many other OECD countries." This proved to be an unwarranted conclusion. Figure 1 shows a country ranking of average annual real GDP growth rates over the period 2008-12. Of the 18 non-Eurozone OECD countries with flexible exchange rates, only two—Iceland and Hungary—performed worse than Denmark. Iceland, of course, was hit by an all-embracing financial meltdown in 2008, which among other things resulted in the implementation of intense fiscal austerity measures. Hungary, in turn, suffered hugely from investors losing confidence in forint-denominated assets (OECD 2010). Government bond auctions began to fail in 2008, as non-resident holders of domestic currency denominated bonds were eager to offload large amounts of securities. Yields surged as a result, rising by much larger margins than in neighboring countries with lower levels of external liabilities (OECD 2010).

Denmark's poor growth performance, on the other hand, is much more surprising, which the OECD quote also attests. Denmark has high income per capita, an equal income distribution (after taking into account taxes and transfers, Denmark has the lowest Gini coefficient in the OECD), high labor market participation, a flexible workforce and a strong social safety net (the so-called flexicurity model), and a strong fiscal framework (OECD 2009). On top of that, according to the World Bank's Doing Business Indicators, Denmark is consistently ranked

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among the best countries in terms of "ease of doing business".

There are three obvious places to look for an explanation of Denmark's meager performance. First, Denmark may have entered the GFC in worse economic shape than the other countries. Second, fiscal policy in Denmark may have failed, or, third, the monetary policy is to blame. We shall consider each of these potential explanations in turn.
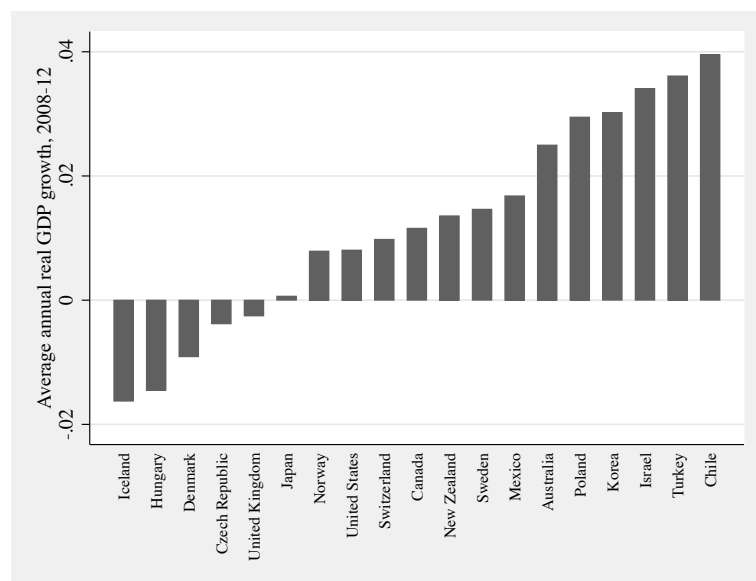

Figure 1: Average annual real (PPP, USD) GDP growth, 2008-12.
Notes: Data source is OECD (2013).

The Danish economy started to slow in 2007, due in large part to an extremely low level of unemployment and the resulting acceleration of wages (OECD 2009).[5] In a fixed exchange rate regime this translates into a loss of competitiveness. Denmark thus entered the crisis with a capacity constrained economy, as also evident by the relatively high output gap for Denmark in Figure 2. A large output gap indicates that productive capacity is unable to keep up with growing aggregate demand (i.e., growth is occurring at an unsustainable rate), and such "overheating" is generally followed by lower than average economic growth because of the need for a (potentially large) correction. Only four countries were as overheated as Denmark, two of which were Hungary and Iceland, cf. Figure 2. This undoubtedly holds part of the answer to the poor Danish growth performance during 2008-12. However, as we will show in Section 3, this is not the most important factor.[6] So let us consider the potential role of fiscal and monetary policy.

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[5] The property boom also started to unwind in 2007; we will have more to say on this below.

[6] The correlation between the output gap in 2007 and 2008 is above 0.7. Therefore, using the gap in 2007
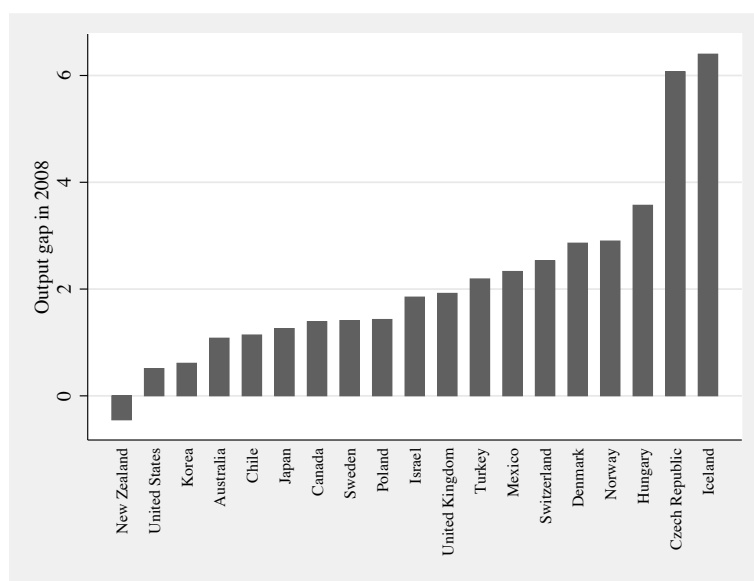
Figure 2: Output gap in 2008.
Notes: The output gap is defined as the deviation of actual GDP from potential GDP as a fraction of potential GDP. Data source is OECD (2013).

There has been much debate about the impact of fiscal stimulus packages, and in particular about the size of the fiscal multiplier. Yet, it seems fair to say that in 2008-09 there was a general recognition that most conditions required for fiscal policy to be effective were met (Bénassy-Quéré et al. 2010). The world was hit by a major demand shock, resulting in a major global output gap and potential deflation risk. Near zero policy interest rates and very low long-term interest rates removed any reasonable crowding out risk. Widespread credit constraints among firms and households raised the likelihood that demand would react positively following an inpouring of public cash. Finally, the fact that many countries would stimulate more or less simultaneously rendered the ineffectiveness of fiscal expansions in floating rate regimes less relevant.

Denmark implemented a large fiscal stimulus package in 2009. In fact, only five countries had (discretionary) stimulus packages with (proportionally) larger sizes than Denmark, cf. Figure 3. As the Danish economy also has large automatic stabilizers (the largest in the OECD according to OECD (2009)), an inadequate stimulus package is unlikely to explain the protracted Danish recovery compared to the other countries. The OECD (2009) also emphasizes that Denmark has a strong, credible and forward-looking fiscal framework. Hence, fiscal policy is likely to be very

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instead of the gap in 2008 would not change the conclusions of the paper.

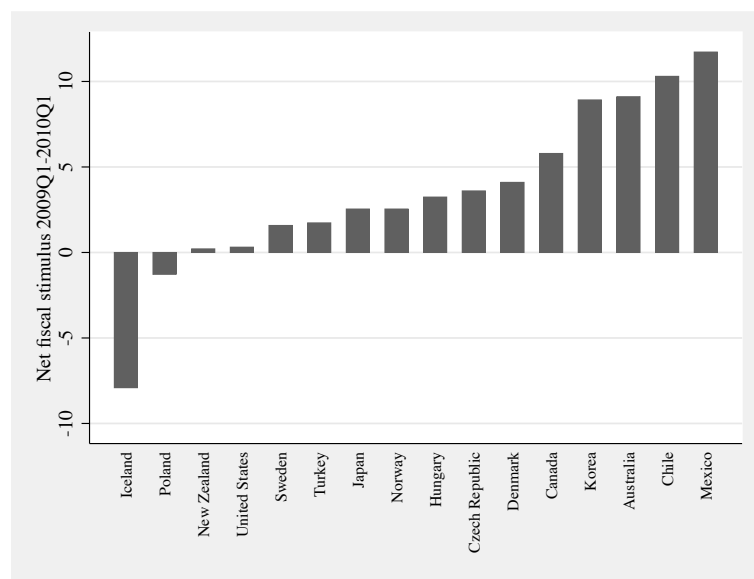effective in Denmark, i.e., interest rates are likely to remain flat following a fiscal expansion.[7]

Figure 3: Net fiscal stimulus.
Notes: Fiscal stimulus is measured as the growth rate of pure fiscal expenditure of the consolidated government during 2009Q1-2010Q1, where pure fiscal expenditure is the real consumption and investment expenditure at any level of government. Data are from Aizenman and Pasricha (2013). Fiscal stimulus information is missing for Israel, Switzerland, and the United Kingdom.

Expansionary monetary policy was also widely adopted by central banks in the OECD. Such monetary easing tends to lead to falling real interest rates, higher asset prices, and a higher supply of credit (Bénassy-Quéré et al. 2010). To explore differences in monetary policy, we define the degree of monetary easing in 2008-09 as $-(i_{2009} - i_{2008})$, where i_t is the average short-term interest rate in year t. Higher values of $-(i_{2009} - i_{2008})$ therefore represent more easing.[8] As shown in Figure 4, Denmark did ease monetary conditions; but it did so only because the ECB did. Furthermore, Denmark did not ease as much as other OECD countries. In fact, Denmark even eased less than the ECB. The reason was that the widespread flight to safety resulted in a major offloading of Danish bonds by investors, which in turn created pressure on the Danish krone. This forced the central bank to raise the leading interest rate above the level

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[7] Aizenman and Pasricha (2013) argue that fiscal stimulus, if anything, lowered borrowing costs in the OECD. This, of course, is possible if markets judge that fiscal stimulus raises the economy's future growth rate and thus its ability to service the debt.

[8] The source is the OECD (2013). According to the OECD, the interest rate, i_t, proxies the rate at which short-term borrowings are effected between financial institutions or the rate at which short-term government paper is issued or traded in the market.

of the ECB ditto successively in 2008.[9] In September 2009 the spread between the Danish policy rate and the ECB rate was finally reduced to 0.25%-point, which (as gauged by the behavior of policy interest during August 2002 to May 2008) represented a return to the historical average (Danish Economic Council 2009).

Precisely because independent monetary policy is not an option for Denmark, while it is an option for the remaining 18 non-Eurozone countries, it makes sense to explore this policy tool in a bit more detail.
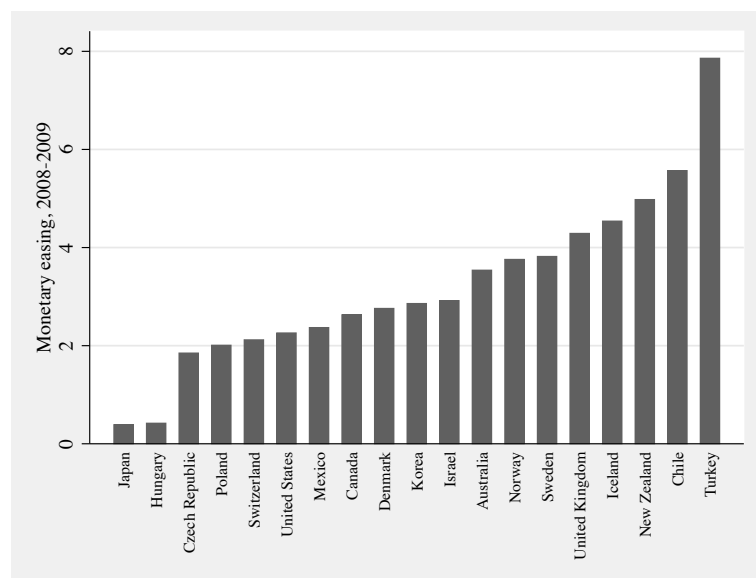

Figure 4: Monetary easing.
Notes: Monetary easing is defined as $-(i_{2009} - i_{2008})$, where i_t is the average short-term interest rate in year t, and where higher values of $-(i_{2009} - i_{2008})$ represent more easing. The source of i_t is the OECD (2013).

According to standard macroeconomic theory (see, e.g., Bénassy-Quéré et al. 2010), a fall in the domestic (policy) interest rate (i.e., monetary easing) implies a fall in the yield of other domestic assets that can be substituted for bonds. With free capital mobility, investors are discouraged from holding domestic assets and encouraged to hold foreign dittos, which via the law of supply and demand leads to a fall in the relative price of domestic assets. In a floating exchange rate setting this amounts to a depreciation of the currency, leading in turn to a real depreciation (at least in a low inflationary environment, where nominal exchange rate movements dwarf price

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[9] Had Denmark been a Eurozone member this would not have happened, and Denmark would have eased more aggressively. Of course, being a Eurozone member would have brought other costs.

movements).[10] Thus, by investigating the correlation between monetary easing and real (effective) exchange rate depreciation and, in turn, the correlation between the real depreciation and export growth, we can gain some insight into how monetary policy worked in the aftermath of the GFC.

Consequently, we first calculate the real effective exchange rate depreciation during 2008-09 as $REER_{2009} - REER_{2008}$, where $REER_t$ is the real effective exchange rate with constant trade weights in year t from OECD (2013), and where $REER_{2009} < REER_{2008}$ corresponds to a real depreciation. We next plot monetary easing against changes in the real effective exchange rate, with the results being shown in Figure 5. Inspection of the figure reveals a clear negative relationship, meaning that more monetary easing is associated with a larger real depreciation. In fact, a simple regression of changes in REER on monetary easing (without a constant term, which is insignificant when included) gives a coefficient -0.015 and a t-value 3.84. Thus, the correlation between the two can be made to stand on an inferential basis.
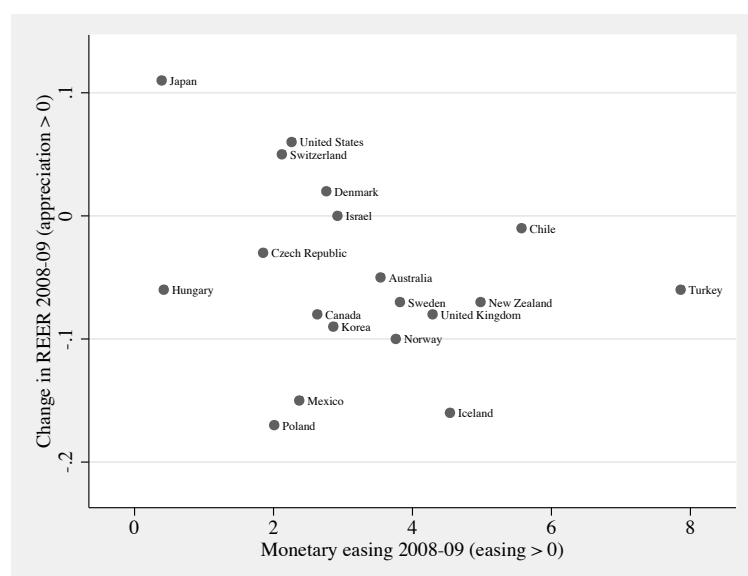

Figure 5: Scatter plot of the degree of monetary easing versus changes in the real (effective) exchange rate.
Notes: Monetary easing is defined as $-(i_{2009} - i_{2008})$, where i_t is the short-term interest rate in year t, and where $-(i_{2009} - i_{2008}) > 0$ represent monetary easing. The change in the real effective exchange rate during 2008-09 is measured as $REER_{2009} - REER_{2008}$, where $REER_t$ is the real effective exchange rate with constant trade weights in year t, and where $REER_{2009} - REER_{2008} < 0$ corresponds to a depreciation. Data source is OECD (2013).

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[10] Central bankers also directly try to influence the exchange rate by *verbal intervention*, which entails central bankers trying to communicate their intentions for the future value of the currency. We neglect direct consideration of such interventions in the present paper.

Note that only three countries saw larger real appreciations than Denmark, viz. Japan, Switzerland, and the United States. For these three countries, the unwinding of the carry trade in 2008-09 goes a long way towards explaining the appreciation (McCauley and McGuire 2009). As investors reduced their positions, funding currencies such as yen and franc appreciated. The dollar in turn was seen as a safe haven and appreciated as a result of the flight to safety into US Treasury bills in late 2008.

The next natural step is to investigate the relationship between export growth and changes in the real exchange rate. We measure export growth as the average annual growth of exports of goods and services (volume, USD 2005 prices) during 2008-10.[11] It is clear from Figure 6 that the size of the real effective exchange rate depreciation is a strong predictor (and arguably a causal determinant) of export volume growth. As before, we can make the correlation between the two variables stand on an inferential basis. A simple regression of the growth in export volume on the change in REER (without a constant term, which is insignificant when included) gives a coefficient -0.041 and a t-value 2.44.
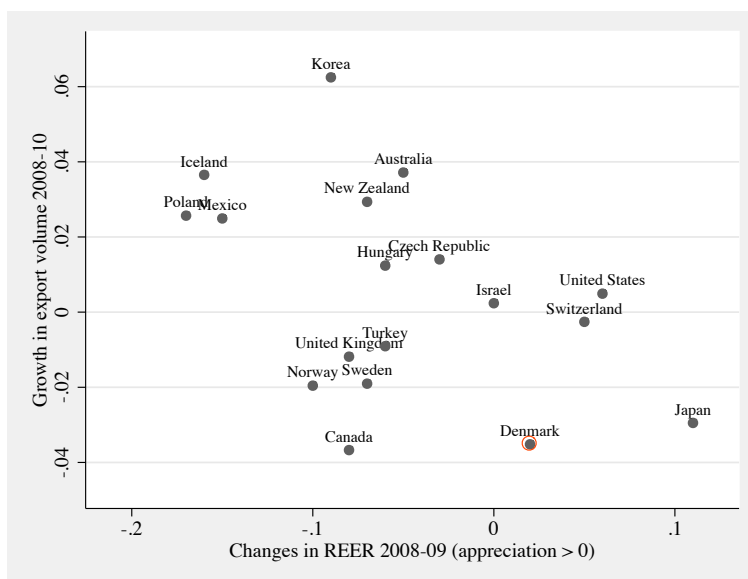

Figure 6: Changes in the real (effective) exchange rate versus growth of export volume.
Notes: The change in the real effective exchange rate during 2008-09, is measured as $REER_{2009} - REER_{2008}$, where $REER_t$ is the real effective exchange rate with constant trade weights in year t, and where $REER_{2009} - REER_{2008} < 0$ corresponds to a depreciation. Growth of export volume is defined as $\log(X_{2010}/X_{2008})/2$, where X_t is export volume in year t. Data source is OECD (2013). Information on export volume is missing for Chile.

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[11] Given J-curve dynamics, one may reasonably wonder whether this is the appropriate period length. Had we instead used 2008-11, results would essentially be the same as those reported in Figure 6.

Note that Denmark experienced the second weakest development in export growth—only Canada did worse. During 2008-10, Danish exports fell by approximately 3.5% per year. As exports constitute close to 50% of GDP, this goes potentially a long way in explaining the poor Danish growth performance. In other words, Figures 5 and 6 suggest that monetary policy must occupy center stage if we want to understand Denmark's poor growth experience during the Great Recession and beyond. By not having eased as aggressively as other OECD countries, Denmark appears to have paid a high cost in terms of negative average annual economic growth during 2008-12. Moreover, it is important to keep in mind that an accusation against Danish monetary policy is an accusation against the fixed exchange rate regime to which monetary policy is subordinated. In the next section we explore these issues and the relative importance of pre-crisis conditions, fiscal policy and monetary policy in a slightly more formal way.

3. Some simple regression evidence

In this section we view the Danish 2008-12 growth performance through the lens of simple regression analysis. This allows us to control for all the factors discussed above simultaneously. Yet, regression analysis in the present setup is not without problems.

First of all, both fiscal and monetary policies entail large international spillover effects. A fiscal expansion at home increases demand for foreign goods, which is a direct spillover effect. In a floating exchange rate regime with capital mobility the resulting exchange rate appreciation further increases demand for foreign goods, which constitutes an indirect spillover effect. This explains why a concerted fiscal expansion, which increases the domestic effect of the fiscal expansion, was advocated in late 2008 (Bénassy-Quéré et al. 2010). Expansionary monetary policy also results in spillover effects, as exemplified by both the currency war and the Fed tapering debate (see, e.g., Eichengreen 2013). Spillover effects undermine standard statistical inference, as it is (almost always) carried out under a cross-sectional independence assumption (see, e.g., Angrist and Pischke 2009, Chapter 8; Wooldridge 2010, Chapter 20, for a discussion of some of these issues). At the same time, monetary and fiscal policies are obviously endogenous, which further complicates interpretation of regression coefficients.

For these reasons, the regression results presented below should primarily be thought of as a consistency check of the simple story told in the previous section. With these admonitions we now turn to some quite basic multivariate regression evidence, and we will (courageously)

interpret regression results as if standard inference and exogeneity assumptions are met.[12]

Consequently, consider the following simple regression model, which should follow naturally from the discussion carried out in the previous section:

(1) $g = \beta_0 + \beta_1 \cdot \text{output gap} + \beta_2 \cdot \text{monetary easing} + \beta_3 \cdot \text{fiscal stimulus} + u.$

In equation (1), g is average annual real GDP growth over the period 2008-12, and the right-hand-side variables are defined as in Figures 2-4. Note that the output gap serves as a type of all-encompassing variable, which picks up a host of influences on the shape of the economy when the crisis hit in 2008. For example, a bubble in house prices prior to 2008 should (at least to some extent) be picked up by the output gap, and so should other mean reversion dynamics. Moreover, monetary easing is a deep determinant of different influences, including changes in the real exchange rate and thus export growth, as documented above. At the risk of being overly cautious, we stress that reasonable people can come up with other variables that arguably should be added to equation (1), and that adding them will potentially thwart the results reported below. This section (as already noted) therefore only serves as a (partial correlation type) consistency check of the story told in Section 2.

Table 1 reports the results. Columns 1, 2 and 3 report, respectively, OLS (ordinary least squares), RREG (robust regression) and LAD (median regression) results. Note that the simple specification in equation (1) explains more than two thirds of the variation in economic growth across the 16 non-Eurozone OECD countries for which all variables are observed. Also note that all coefficient estimates are statistically significant at, at least, the 10% level.

In terms of economic significance, the beta coefficients (i.e., the standardized coefficients) associated with OLS estimation are -0.45, 0.50, and 0.35 for the output gap, monetary easing, and the net fiscal stimulus, respectively.[13] In this sense, monetary policy is therefore 43% $(= 0.50/0.35 - 1)$ more important (at least in terms of predicting economic growth during

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[12] We are, of course, just being explicit about a practice most (if not all) other empirical macro papers implicitly adopt.

[13] The beta coefficients tell us how many standard deviations the dependent variable (average annual real GDP growth) would change given a one-standard-deviation change in the relevant independent variable. For example, growth would *fall* by 0.45 standard deviations following a one-standard-deviation *increase* in the output gap.

2008-12) than fiscal policy. Using either robust or median regression (columns 2 and 3) only increases the relative importance of monetary policy.

	(1)	(2)	(3)
Estimator	OLS	RREG	LAD
Dependent variable	Growth in real GDP (PPP, 2005 USD) 2008-12		
Output gap	-0.0042**	-0.0029**	-0.0043*
	(0.0016)	(0.0010)	(0.0021)
Monetary easing	0.0046***	0.0055***	0.0061**
	(0.0012)	(0.0009)	(0.0023)
Fiscal stimulus	0.0012*	0.0018***	0.0015*
	(0.0007)	(0.0004)	(0.0008)
Constant	0.0019	-0.0075	-0.0049
	(0.0099)	(0.0049)	(0.0137)
Observations	16	16	16
R-squared	0.702	0.873	

Table 1: Regression results.
Notes: The output gap is defined as the deviation of actual GDP from potential GDP as a fraction of potential GDP. Monetary easing is defined as $-(i_{2009} - i_{2008})$, where i_t is the short-term interest rate in year t, and where $-(i_{2009} - i_{2008}) > 0$ represent monetary easing. The data source for both the output gap and interest rates is OECD (2013). Fiscal stimulus is measured as the growth rate of pure fiscal expenditure of the consolidated government during 2009Q1-2010Q1, where pure fiscal expenditure is the real consumption and investment expenditure at any level of government. Data are from Aizenman and Pasricha (2013). OLS standard errors are robust. LAD standard errors are bootstrapped with 200 replications.

The relative importance of monetary policy is obviously interesting in the present context because Denmark has in effect outsourced its monetary policy to the ECB. During the Great Recession, the fact that Denmark could not independently lower monetary policy rates represented a disadvantage, ceteris paribus.[14] We can try to quantify the cost of not having

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[14] In the Danish central bank's Monetary Review, Blomquist et al. (2010) argue that the fixed exchange rate regime is not responsible for Denmark's weak growth performance during the Great Recession. Indeed, they dismiss the importance of monetary easing by reference to the fact that the United Kingdom eased aggressively and yet also did poorly in terms of comparative economic growth during the Great Recession. As this section demonstrates, adopting a broader comparative perspective in terms of countries and years leads to a markedly different conclusion.

monetary policy independence under the Great Recession by calculating counterfactual growth in Denmark under the (counterfactual) assumption that Denmark had reduced its short-term interest rate to the level of Sweden in 2009. Sweden reduced the interest rate by 3.82%-points—from 4.74% to 0.92%—while Denmark only reduced it by 2.76%-points—from 5.26% to 2.50%—see also Figure 4. Had Denmark reduced the interest rate to 0.92%, monetary easing in Denmark would instead have been 4.34%-points. Using column 1 of Table 1, this difference of 1.58 %-points translates into an average annual growth difference of 0.73%-point (= 0.0046× 1.58). Put differently, had Denmark slashed interest rates to the level of Sweden, average annual real GDP growth in Denmark would (according to our calculations) have been 0.73%-points higher during 2008-12. Actual average annual real GDP growth in Denmark during 2008-12 was −0.91%, so in the counterfactual scenario it would have been −0.18%. It should be noted that this calculation constitutes a conservative estimate; it would have been higher, had we instead done the calculation using either column 2 (0.87%-points) or column 3 (0.96%-points) of Table 1.

For comparison, had Denmark experienced an output gap similar to that of Sweden when entering the crisis in 2008—i.e., an output gap of 1.41% instead of 2.86%—this would, again using our estimates from Table 1, have translated into 0.61%-points (= −0.0042×(−1.45)) higher annual growth.

As Denmark already had one of the highest levels of fiscal stimulus, a similar counterfactual exercise cannot me made in this case. However, had Denmark only implemented a fiscal stimulus of the size used in Sweden, this would have implied *lower* annual growth of 0.30%-point (= 0.0012×(−2.52)) based on the estimates in Table 1.

In sum, our simple regression predicts that differences in monetary easing stand out as most important factor in understanding the growth difference between these two Nordic neighbors in the period 2008-12. However, it also shows that differences in pre-crisis conditions may help explain why Denmark did so poorly compared to Sweden in the years following the GFC. The following section therefore considers the role of monetary policy in shaping the economy in the years leading up to the crisis.

4. The role of the fixed exchange rate in the years leading up to the crisis

Most observers agree that a bubble in the property market hit Denmark by mid 2000s. Indeed, this seems to have been the case for a number of OECD economies (André 2010). Yet for

Denmark, to a greater degree than many other OECD countries, the crisis coincided with the unwinding of the property bubble (OECD 2009). As monetary policy importantly influences asset prices, including real estate, this raises two questions: First, have misalignments in the property market prior to the outbreak of the crisis affected subsequent growth? Second, could and would that have been (partly) avoided with an independent monetary policy by the Danish central bank? Note that answering the first question also implicitly addresses the assumption made above, viz. that the output gap picked up (most of) the effect of the housing bubble.

There are two basic approaches to measuring misalignments in the housing market (Cobham 2012). There is the structural approach, which usually looks at the affordability of housing, and there is the asset-pricing approach, which often entails looking at the price-rent ratio. In the present paper, we will focus on the former.[15] The most widely used structural-approach indicator of housing market conditions is the price-to-income (PI) ratio. Historically, this ratio has tended to revert to its long-term average. Hence, large deviations of the PI ratio from its long-term average are generally taken to indicate over- or under-valuation of houses. The PI ratio can be thought of as a measure of the affordability of housing, and the dynamics driving the PI ratio back to its long-term average are straightforward: When house prices rise relative to disposable income, it becomes increasingly difficult for households to buy dwellings. This will typically reduce their demand, which drives prices down (André 2010).

Of the 11 countries for which we have data for the PI ratio, Denmark is the country where house prices exhibited the largest degree of misalignment in 2007 (as gauged by this particular indicator), cf. Figure 7.

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[15] For completeness, it should be noted that using the latter instead would give almost exactly the same results. The correlation between the price-rent ratio (the key asset-pricing approach indicator) and the price-income ratio (the key structural approach indicator) in 2007 is 0.91.
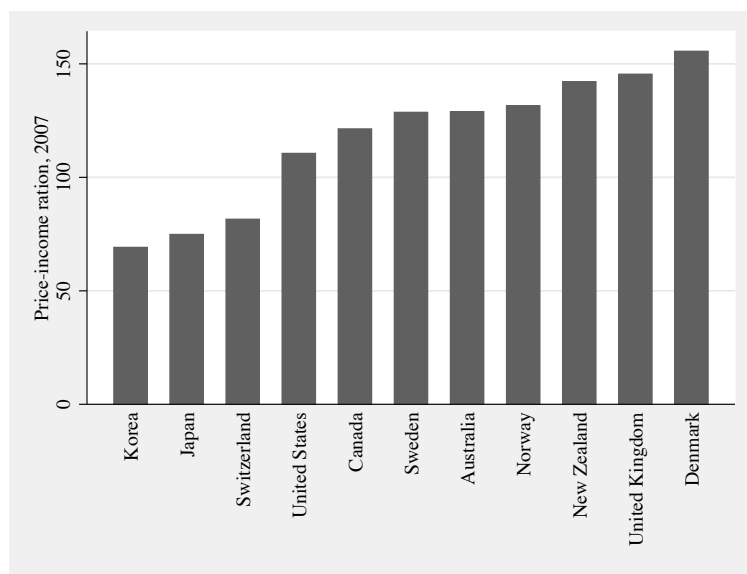
Figure 7: Price-to-income ratio in 2007.
Notes: The data source is the online annex tables to the Economic Outlook
(http://www.oecd.org/eco/outlook/economicoutlookannextables.htm).

Did this affect growth after 2008? From a theoretical point of view, consumption demand is likely to be negatively affected by a (larger) crisis-induced drop in house prices through both a wealth effect and a collateral effect. Furthermore, although residential investment is a small component of GDP, it is rather volatile and may have a large impact on economic growth; and residential construction is labor intensive, thus influencing employment in important ways. This also finds support in the data. Using the nine countries for which we have data on the PI ratio and the other variables from Table 1, Figure 8 shows the partial correlation (partialling out the output gap, the net fiscal stimulus, and monetary easing) between house price misalignments in 2007 and growth during 2008-12. The tight negative (partial) correlation between house price overvaluation and subsequent economic growth supports the idea that house price misalignments affect growth. Actually, with the PI ratio included, the partial correlation between the output gap and growth diminishes and becomes insignificant, which indicates that house price overvaluation is an important determinant of the output gap.[16]

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[16] With only nine observations inference is difficult, for which reason we only report the partial correlation plot above. The underlying regression is $g = \mathbf{0.019} – 0.0025 \cdot \text{output gap} + \mathbf{0.0073} \cdot \text{monetary easing} + \mathbf{0.0016} \cdot \text{fiscal stimulus} – \mathbf{0.0003} \cdot \text{PI}$, where the R-squared 0.91 and a **boldface** slope estimate indicates statistical significance at or below 10%. Thus, the inclusion of the PI ratio does not seem to diminish the importance of monetary policy. If anything, monetary policy becomes even more important by including the PI ratio – both compared to Table 1 and to a regression on the nine countries where PI is not included (results not reported). However, we should, of course, be careful not to put too much weight on a regression with just nine countries included.
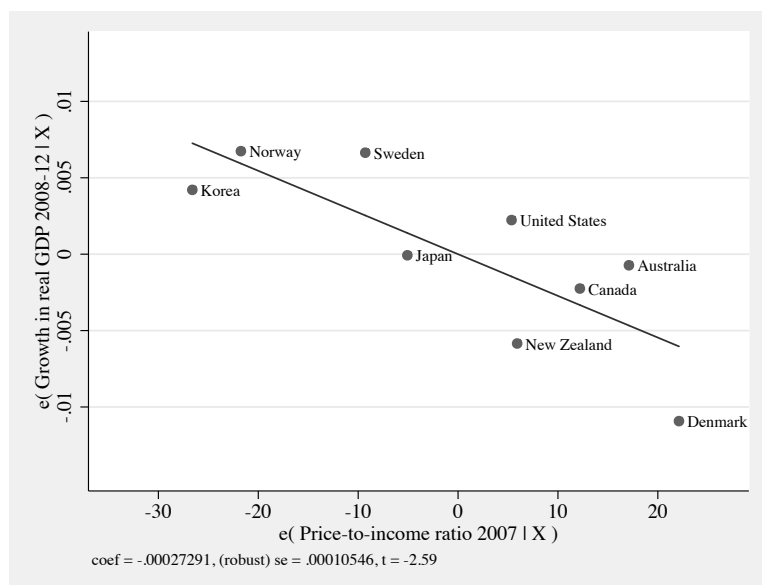
Figure 8: Partial correlation plot.
Notes: The figure plots the partial correlation between the price-to-income ratio in 2007 and average annual real GDP growth during 2008-12, when the influence of the output gap, the net fiscal stimulus, and the monetary easing are partialled out.

As monetary policy importantly influences asset prices, including house prices, this indicates that monetary policy aimed at controlling house price misalignments prior to the GFC would have been amply rewarded in terms of a faster recovery from the Great Recession. Specifically, using the partial correlation from Figure 8 and the footnote above, had the PI ratio in Denmark been at the same level as in Sweden in 2007, annual growth in 2008-12 could have been 0.73%-point higher.

Under independent monetary policy, the Danish central bank could have attempted to counter the rise in house prices by an interest rate increase. Whether it would have done so is of course an entirely different matter. Cobham (2012), for instance, argues that the Federal Reserve and the Bank of England were deeply committed to the (orthodox) view that responding to asset prices is inappropriate, and for this reason they did not devote much resources to monitor house prices. The ECB, on the other hand, was fully cognizant of misalignments as of 2006. In conjunction with the fact the Danish central bank argued in favor of a fiscal tightening of 0.5% of GDP in the third quarter of 2006 (see Nationalbanken 2006), this suggests that the central bank might actually have considered an interest rate increase in 2006, had this policy lever been part of its toolbox.

Overall, the evidence presented in this section suggests that having handed over its monetary

policy autonomy to the ECB was not just a problem for Denmark after 2008; it was also a problem prior to the outbreak of the GFC in 2008. In particular, the fact that the Danish central could not raise its policy interest rate independently in 2006 in order to pour water on a red-hot property market is likely to have exacerbated the crisis in Denmark.

5. Conclusion

The argument made in this paper is that the Danish fixed exchange rate regime is likely to have aggravated the economic crisis in Denmark. The inability to pursue independent monetary policy prior to the crisis had worsened the state of the economy as the GFC hit in earnest in 2008. In particular, the Danish economy entered the crisis with a severely overstretched economy (captured by a large output gap), resulting in part from the house bubble. The output gap could possibly have been reduced and house prices stabilized by an interest increase in 2006.[17] At the same time, the inability to conduct independent monetary policy once the crisis hit likely prolonged the recovery from the triple whammy of a house price bubble, a global financial crisis, and an ensuing sovereign debt crisis in the Eurozone. Countries that pursued aggressive monetary easing saw large real (effective) exchange rate depreciations, which in turn held a stabilizing hand under export growth. Moreover, a lower interest rate stabilized property prices once the crisis hit.

It would of course be foolish to claim that one exchange rate regime always and everywhere dominates all other regimes.[18] However, the analysis presented in this paper suggests that the choice of exchange rate regime is *not* irrelevant, as e.g. Rose (2014) claims it is. Indeed, our analysis makes plausible that a fixed exchange rate regime can be quite taxing on economic growth in the aftermath of a huge adverse shock. This view of course echoes one of the important policy lessons learned from the 1930s (see Eichengreen and Sachs 1985; Bernanke 1995), namely the important role played by currency depreciation (i.e., going off gold) in escaping the negative growth dynamics of the Great Depression.

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[17] Of course, bad economic policy on part of the government such as the tax freeze did not help. But a higher interest rate could have countered this.

[18] See Truman (2014) for a very balanced discussion of this issue.

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