ONLINE APPENDIX TO:

Birth Weight and Vulnerability to a Macroeconomic Crisis

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Online Appendix A

The Swedish crisis

Here, we summarize the roots of the Swedish crisis, relying heavily on Englund (1999) and Holmlund (2011). At the beginning of the 1980s the Swedish economy was characterized by a regulated credit market, a fixed exchange rate, and fiscal policies that aimed at full employment. Inflation, to a large extent driven by rapidly increasing wages, was consistently higher than in the neighboring economies and reached a high of over 10 percent in 1990 (Holmlund, 2011). In order to protect its export industry from increasing costs, Sweden devalued the Swedish krona on six occasions between 1973 and 1982.

Despite high inflation, the real interest rate was extremely low, and sometimes even negative, as a result of a tax system with high marginal tax rates combined with generous opportunities for interest deductions. The Swedish credit market had been tightly regulated since World War II, but was deregulated during the first half of the 1980s. The increased ability to borrow, combined with a tax system that made loans cheap, created a price bubble in the real estate sector. Further, and as discussed earlier, unemployment was low throughout the decade, and extremely low in the second half, and probably lower than equilibrium level of unemployment (Holmlund, 2011). Overall, these circumstances led to sharp increases in prices and wages in the Swedish market in the late 1980s.

Then a series of factors - mostly policy-driven - interacted to create a sharp contraction of the Swedish economy. We make no statement about which factors were most important and only aim to describe them. First, in 1991 a new tax system with lower marginal tax rates and reduced opportunities for interest deductions was introduced. This implied an increase in real interest rates, resulting in a sharp fall in property prices. In downtown Stockholm, the price of real estate decreased by 35 percent in 1991 (Englund, 1999, p.90). Between 1988 and 1992 household savings increased by 12 percentage points, which constituted an important reason for the sharp decline in domestic demand between 1990 and 1993 (Holmlund, 2011, p.4).

Second, the central bank decided to defend a fixed exchange rate. This implied that devaluations of the Swedish currency were no longer going to be used to compensate for the negative effect of wage inflation on the competitiveness of the export industry. In the end of the 1980s, production and employment in the export industry started to fall rapidly. The central bank defended the fixed exchange rate until November 1992 when they finally decided to float the Swedish krona, which in practice led to a devaluation of the currency. The defense of the

fixed exchange rate also led to increased interest rates, but internationally higher interest rates as a result of the German unification and the introduction of the new tax system also played a role in this increase (Englund, 1999, p.89).

Third, the crisis coincided with a dramatic reduction in labor demand in the public sector. This was caused by large deficits in public finances during this period, leading to cuts in public spending. Instead of compensating for the fall in demand for labor in the private sector, as was often done in the past, the reduction in public employment instead contributed to the fall in overall employment during the crisis.

The crisis lasted until the late 1990s. The reason for this prolonged period of the crisis was a desire to keep fiscal and monetary policies restrictive. Monetary policy had to be restrictive in order to create credibility for the new low-inflation regime, while fiscal policy had to deal with the budget deficit by increasing taxes and cutting costs. During the late 1990s both fiscal and monetary policy became less restrictive, while at the same time the international economy improved.

Employment Protection Laws in Sweden

Numerous theses and articles have been written in the field of law during the last ten years concerning the Swedish Employment Protection Act (SEPA).The consensus in this literature seems to be that SEPA has gradually, since its start in 1982, lost its original intention on how to protect employees in the case of dismissal. The intent was to force employers to use objective standards (so-called “turordningsregler" in Swedish) when deciding on whom to dismiss, but cases/practice in court has turned to increasingly meet employer’s interest in choosing subjectively whom to fire.

The SEPA actually consists of two criteria: dismissals made for personal reasons and dismissals made due to a redundancy of labor. We start by discussing the latter, since it is likely to be the more common one implemented during the crisis. The SEPA dictates that a shortage of work ought to be the main justification for laying off workers and that a dismissal by the employer must be made on objective grounds. When a firm decides to lay off some of its employees for this reason it is not allowed to choose at will, instead the protection of employees is met by implementing a seniority rule, the so called “last-in-first-out" principle.

However, the SEPA contains a number of possibilities to circumvent this principle, making it possible for employers to subjectively choose whom to dismiss. For example, if the firm is bound by collective agreements, and a clear majority of firms in Sweden are, the workforce at the firm can be divided into smaller units based on their union affiliation and work task, and the “last-in-first-out”

principle can then be applied to each such unit separately. This implies that during a crisis, layoffs can be directed towards a specific unit within the firm, and hence, make it possible to keep those workers that are important to the firm, and dismiss those that are not (see Von Below and Skogman Thoursie (2010) for more details).

Furthermore, the SEPA also allows employers to discriminate based on personal reasons when deciding whom to dismiss, for example that a worker's education or another type of qualification is deemed insufficient. The employer can even be allowed to dismiss workers based on personal characteristics, if these same characteristics can be motivated as being important for doing the job. Wilhelmsson (2001) presents a large number of cases that have been ruled in the Labor Court in line with the view of the employer. A worker's low performance, insufficient customer focus and results orientation has been ruled by the Labor Court as acceptable for a termination due to incompetence or lack of professional skills, a worker's lack of judgment as a basis for a dismissal because of negligence, and a worker's poor health or inadequate body constitution forms the basis for a dismissal because of reduced work capacity. However, after reading a few of these court cases ourselves it is fair to say that the Labor Court sometimes rule in line with the employer, but also in line with the employee being dismissed. For example, in case AD 1993:42 a company was allowed to dismiss two employees who due to work related injuries could no longer perform some common work tasks. In another case, AD 1994:115, an employee had undergone rehabilitation for a long time and could only work part-time. The employer dismissed him due these factors, but this was turned down by the court. To summarize, Glavå (1999), Rönnmar (2001), Calleman (2000) and Wilhelmsson (2001) all argue that the "last-in-first-out" principle basically has lost its initial intentions and rendered unclear practice governing dismissals in the Swedish labor market.

Surprisingly, given the amount of political debate over SEPA in Sweden there has been very little work on the causal effect of the SEPA on hiring and dismissal strategies of firms; hence it is hard to answer the question of whether the seniority rule is truly binding or not. However, we have found one study for Sweden looking exactly at whether the separation strategies of firms changes when SEPA was reformed. In 2001 there was a reform of the SEPA targeted at smaller firms, making it possible for firms with ten employees or fewer to withdraw two of its employees from the ranking list of who to dismiss. Hence, the rules governing dismissals with respect to seniority became more lenient after the reform. Von Below and Skogman Thoursie (2010) use this reform in a difference-in-difference framework and analyze whether the reform changed the dismissal due to seniority differently

for small (2-10 employees) and large (11-15 employees) firms. They find that the effect of the reform was smaller for workers with long tenure (5 years or longer, making up around 15-18 percent of the data) compared to workers with short tenure (0-4 years, see Panel C in their Table 3). Since the exemption rule was expected to make it *easier* for firms to layoff workers with long seniority, one interpretation of this result is that the seniority rule was not in effect even before the reform.

References

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Online Appendix B

Online Appendix Table B.1
Sample selection

Sample	No. of individuals	No. of twin pairs
A. Raw BIRTH Data	46,618	23,309
B. Within sample A, only those with information on birth weight	35,318	17,659
C. Within sample B, only same sex twins	26,418	13,209
D. Within sample C, only those with information on sector of employment in 1985	20,738	10,369
E. Within sample D, only those where both twins are employed in the same sector in 1985	14,154	7,077
F. Within sample C, only those with information on sector of employment in 1990	20,190	10,095
G. Within sample F, only those where both twins are employed in the same sector in 1990	13,632	6,816
H. Number of unique twin pairs across samples E and G combined (main analysis sample)		
total	16,822	8,411
in the private sector	10,962	5,481
in the public sector	5,860	2,930

Notes: The table shows how subsequent restrictions of the sample reduce the number of observations from the raw BIRTH data (sample A) to the sample used in the main analysis (sample H, which combines samples E and G). At each step, only the twin pairs where the indicated information is available for both twins are retained. Next to conditioning on both twins being employed in the same sector (private versus public), samples E and G also require both twins to earn a positive income and to have information on UI benefit receipt. Note that in the final sample, not all twin pairs are observed in all years, with some pairs only observed in the pre-crisis period and some pairs only observed in the post-crisis period.

Online Appendix Table B.2

Effects of birth weight on receipt of UI and UI/total income, estimates without twin fixed effects

	receipt of UI		UI/total income	
	Private	Public	Private	Public
	(1)	(2)	(3)	(4)
log birth weight	–0.0000	0.0010	0.0001	0.0002
	(0.0017)	(0.0024)	(0.0002)	(0.0002)
post	0.3257**	0.1070	0.1720**	0.0358
	(0.1312)	(0.1283)	(0.0775)	(0.0704)
log birth weight × post	–0.0241	–0.0053	–0.0134	–0.0014
	(0.0166)	(0.0163)	(0.0098)	(0.0090)
No. of observations	89,858	46,994	89,858	46,994
No. of twin pairs	5,481	2,930	5,481	2,930

Notes: The table shows estimates from regressions like in Table 3, with the only difference being that twin fixed effects are not controlled for. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.3

Effects of birth weight on receipt of UI and UI/total income, balanced panel of twins

	receipt of UI		UI/total income	
	Private	Public	Private	Public
	(1)	(2)	(3)	(4)
log birth weight	–0.0180	0.0014	–0.0066	0.0052
	(0.0165)	(0.0171)	(0.0096)	(0.0079)
post	0.3522**	0.1346	0.1994**	0.0265
	(0.1443)	(0.1182)	(0.0841)	(0.0509)
log birth weight × post	–0.0287	–0.0114	–0.0177*	–0.0013
	(0.0183)	(0.0151)	(0.0107)	(0.0065)
No. of observations	69,120	35,260	69,120	35,260
No. of twin pairs	3,456	1,763	3,456	1,763

Notes: The table shows estimates from regressions like in Table 3, with the only difference being that the sample is restricted to twins observed in every year between 1986-1990 and 1993-1997. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.4

Effects of birth weight on receipt of UI and UI/total income, measurement error analysis

	receipt of UI		UI/total income	
	Private (1)	Public (2)	Private (3)	Public (4)
log birth weight	–0.0148	–0.0117	–0.0081	0.0006
	(0.0145)	(0.0147)	(0.0085)	(0.0071)
post	0.3732***	0.1827	0.2230***	0.0389
	(0.1373)	(0.1129)	(0.0802)	(0.0494)
log birth weight × post	–0.0314*	–0.0176	–0.0207**	–0.0029
	(0.0174)	(0.0144)	(0.0102)	(0.0063)
No. of observations	89,858	46,994	89,858	46,994
No. of twin pairs	5,481	2,930	5,481	2,930

Notes: The table shows estimates from regressions like in Table 3, with the only difference being that the continuous birth weight variable is recoded into 50g bins before taking logs. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.5
Effect of birth weight on UI/total income, controlling for total income

	Private (1)	Public (2)
log birth weight × post	–0.0222**	–0.0033
	(0.0099)	(0.0064)
No. of observations	89,858	46,994
No. of twin pairs	5,481	2,930

Notes: The table shows estimates from regressions of UI/total income like in Table 3, with the only difference being that indicators for 10 deciles of total income are additionally included as controls. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.6

Effects of birth weight on receipt of UI and UI/total income, further different sample periods

	receipt of UI		UI / total income	
	Private	Public	Private	Public
	(1)	(2)	(3)	(4)
	Panel A: 1986-1990 vs 1991-1992 vs 1993-1997			
log b. weight × 91-92	0.0018	0.0036	–0.0009	0.0005
	(0.0042)	(0.0030)	(0.0011)	(0.0004)
log b. weight × 93-97	–0.0313*	–0.0179	–0.0203**	–0.0032
	(0.0176)	(0.0147)	(0.0103)	(0.0064)
No. of observations	106,002	55,734	106,002	55,734
	Panel B: 1986-1990 vs 1992-1996			
log birth weight × post	–0.0304*	–0.0112	–0.0181*	–0.0017
	(0.0175)	(0.0144)	(0.0099)	(0.0066)
No. of observations	90,130	47,128	90,130	47,128
	Panel C: 1978-1990 vs 1993-1997			
log birth weight × post	–0.0314*	–0.0195	–0.0202*	–0.0037
	(0.0176)	(0.0145)	(0.0103)	(0.0064)
No. of observations	163,572	84,558	163,572	84,558
	Panel D: 1988-1990 vs 1993-1995			
log birth weight × post	–0.0312	–0.0110	–0.0218**	–0.0015
	(0.0193)	(0.0147)	(0.0106)	(0.0063)
No. of observations	53,938	28,234	53,938	28,234

Notes: The table shows estimates from regressions like in Table 3 for samples with different definitions of the pre- and post-crisis period as indicated in each panel heading. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.7

Effects of birth weight on receipt of UI and UI/total income, non-linear effects

	receipt of UI		UI/total income	
	Private (1)	Public (2)	Private (3)	Public (4)
bw $\leq$ 1500g $\times$ post	0.0398	0.0111	0.0196	0.0089
	(0.0331)	(0.0225)	(0.0212)	(0.0115)
bw $\leq$ 2000g $\times$ post	0.0332***	0.0147	0.0192***	0.0033
	(0.0121)	(0.0096)	(0.0070)	(0.0041)
bw $\leq$ 2500g $\times$ post	0.0107	0.0033	0.0075*	–0.0003
	(0.0069)	(0.0059)	(0.0040)	(0.0027)
bw $\leq$ 3000g $\times$ post	–0.0057	0.0079	–0.0008	0.0007
	(0.0077)	(0.0074)	(0.0045)	(0.0034)
No. of observations	89,858	46,994	89,858	46,994
No. of twin pairs	5,481	2,930	5,481	2,930

Notes: The table shows estimates from regressions like in Table 3, with the only difference being that the continuous birth weight variable is replaced by indicators for falling below a specific birth weight threshold. Each coefficient in the table comes from a different regression. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.8

Effects of birth weight on receipt of UI and UI/total income, split by gender and zygosity

	receipt of UI		UI/total income	
	Private	Public	Private	Public
	(1)	(2)	(3)	(4)
	Panel A: Male monozygotic twins			
log birth weight × post	0.0278	–0.0972	0.0135	–0.0403
	(0.0330)	(0.0591)	(0.0196)	(0.0278)
No. of observations	26,164	4,282	26,164	4,282
No. of twin pairs	1,541	275	1,541	275
	Panel B: Male dizygotic twins			
log birth weight × post	–0.0438*	–0.0489	–0.0262*	–0.0071
	(0.0249)	(0.0366)	(0.0148)	(0.0146)
No. of observations	40,072	4,426	40,072	4,426
No. of twin pairs	2,387	284	2,387	284
	Panel C: Female monozygotic twins			
log birth weight × post	–0.1706***	–0.0152	–0.1130***	–0.0044
	(0.0573)	(0.0245)	(0.0325)	(0.0103)
No. of observations	9,874	16,670	9,874	16,670
No. of twin pairs	634	1,014	634	1,014
	Panel D: Female dizygotic twins			
log birth weight × post	–0.0008	0.0132	–0.0129	0.0089
	(0.0557)	(0.0223)	(0.0287)	(0.0101)
No. of observations	12,332	21,178	12,332	21,178
No. of twin pairs	826	1,330	826	1,330

Notes: The table shows estimates from regressions like in Table 3 for different sub-samples as indicated in each panel heading. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.

Online Appendix Table B.9

Effects of birth weight on receipt of UI and UI/total income, split by cohorts

	Private		Public	
	Born 1926-1942 (1)	Born 1943-1958 (2)	Born 1926-1942 (3)	Born 1943-1958 (4)
	Panel A: receipt of UI			
log birth weight	–0.0345	–0.0056	–0.0194	–0.0070
	(0.0245)	(0.0183)	(0.0236)	(0.0190)
post	0.5098**	0.3070*	0.0668	0.2596*
	(0.2559)	(0.1657)	(0.1475)	(0.1536)
log birth weight × post	–0.0494	–0.0226	–0.0047	–0.0264
	(0.0324)	(0.0210)	(0.0188)	(0.0196)
No. of observations	29,518	60,340	14,402	32,592
No. of twin pairs	1,821	3,660	876	2,054
	Panel B: UI/total income			
log birth weight	–0.0202	–0.0025	–0.0194	–0.0070
	(0.0145)	(0.0107)	(0.0236)	(0.0190)
post	0.2516	0.2046**	0.0668	0.2596*
	(0.1630)	(0.0915)	(0.1475)	(0.1536)
log birth weight × post	–0.0240	–0.0184	–0.0047	–0.0264
	(0.0207)	(0.0116)	(0.0188)	(0.0196)
No. of observations	29,518	60,340	14,402	32,592
No. of twin pairs	1,821	3,660	876	2,054

Notes: The table shows estimates from regressions like in Table 3 for two different sub-samples, which cover different cohorts. Standard errors in parentheses clustered at the twin pair level. * p<0.10, ** p<0.05, *** p<0.01.