Bayesian Inference for TIP curves: An Application to Child Poverty in Germany

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Online Appendix

A Prior information and Gibbs sampler

We were running as many Gibbs samplers as we had to produce graphs of the TIP curves. We used each time 10 000 draws, dropping the first 4 000 draws for warming the chain. We used a three member mixture for disposable income and for smoothed income. The number of components was selected using a BIC criterion. We took equal prior prior probabilities for η_k with $\gamma_k^0 = 5$ for all k. We took identical prior expectation of μ_k for each component, setting it equal to the weighted sample mean of $\log y$ and choosing prior precision $n_k^0 = 1.0$. For each $\mathrm{E}(\sigma_k^2)$, we took an increasing fraction of the weighted sample variance of $\log y$, corresponding to the sequence $(0.25, 0.5, 1.0)$ for 3 components with $\nu_k^0 = 50$. This prior is coherent with the Gibbs algorithm given in the main text where an ordering constraint is imposed on σ_k^2 to cope with label switching.[1] Standardised CUMSUM graphs were used to check for convergence.

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[1]See e.g. Fruhwirth-Schnatter (2006, Chap. 3) for more details on label switching.

B The Hartz reforms and child benefits

The income-support for working-age individuals has been the most affected by the Hartz reforms, see Konigs (2014) for an extensive review. Until 2005, the individual's income after a job loss was partially replaced by the unemployment insurance benefits (UI, Arbeitslosengeld) for a limited amount of time (12-31 months), with eligibility being conditional on contribution records. The level of the benefit was independent of individual means and it was greater for individuals with children. When UI expired, individuals could claim unemployment assistance benefits (UA, Arbeitslosenhilfe) for an unlimited amount of time, they are also earnings-related but less generous than UI and means-tested on family income. Finally, social assistance (SA, Sozialhilfe) was the last resort. A gradual tightening of eligibility criteria for UI and UA over time resulted in a growing numbers of individuals that had shifted into SA (Konigs 2014). After the introduction of the Hartz reforms, the UI was replaced by the unemployment benefit I (UBI, Arbeitslosengeld I) with an initially unchanged maximum benefit duration and replacement rate. In 2006, the maximum duration was lowered to 18 months but raised again to 24 months in 2008. The UA was replaced by the unemployment benefit II (UB II, Arbeitslosengeld II) which was not earnings-related. Social assistance was henceforth restricted to individuals incapable of work.

Before and after the reform, an income-tested Housing Benefit (HB, Wohngeld) is targeted at low-income households (except those entitled to SA). Since 2005, as recipients of SA, recipients of UBII cannot be eligible for HB but they can receive support for eligible housing expenses (HE).

A large part of the family support policy in Germany comes from the child benefits (Kindergeld), about 1.6% of GNI in 2009. They have not changed deeply since 1996, and benefits only depend on the number of children. They are monthly paid to every legal guardian of children (under 18 years old, exceptions exist until 25) as a cash benefit or as a tax deduction (Kinderfreibetrag), the latter being rather rare, about 4.4% of total child benefit in 2009. If children live with persons in need of social assistance, they are entitled to social assistance too. As well, if children live with persons with very low incomes, they can perceive the means-tested supplementary child allowances (Kinderzuschlag). This was introduced in 2005 along with the Hartz reforms and aims at targeting households that fall below the needs thresholds of the new unemployment benefit II only because they have children. According to Nygård et al. (2015), *the new benefit represented a dramatic shift in German family policy by introducing a social right that is not only fairly gender-neutral and non-taxable, but one that is also income-related, in order to also give higher (male) wage earners a stimulus to get children and to stay*

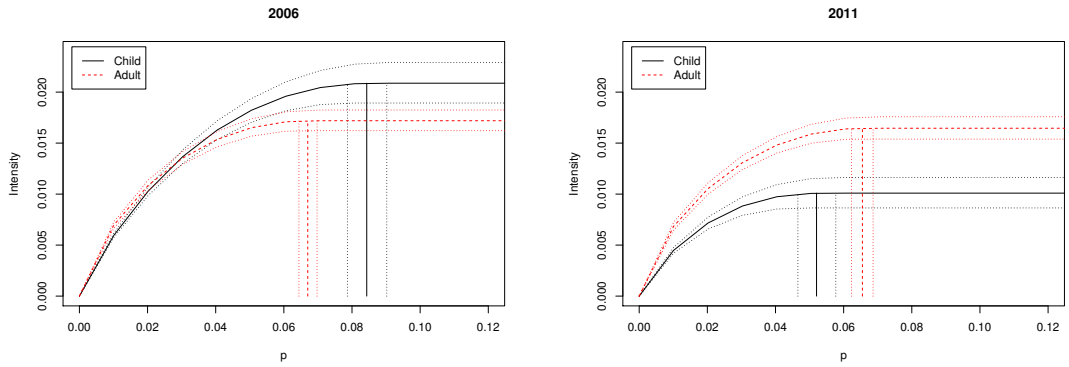
home with them.

C Adult poverty compared to child poverty

We consider as adults the members of a household that are over 18 and that have no child (as in Corak et al. 2008). This corresponds to young single or married adults or to elder people. When contrasting child and adult poverty, we highlight two features. Is poverty concentrated in families with children, eventually large ones? And what is the effect of family allowances on child poverty (households with only adults are not receiving this type of allowances)?

Corak et al. (2008) found that there was an increasing discrepancy between adult and child poverty rates between 2000 and 2004 for whole Germany, the child poverty rate increasing more than the adult poverty rate. Figure 1 confirms the message of Corak et al. (2008) for 2006, but with some delay. Child poverty head-count and intensity are significantly greater their adult counterpart. But TIP curves are intersecting in their lower part. So the assertion of Corak et al. (2008) is not complete, because we do not have TIP dominance between children and adults for 2006 as confirmed in Table 2.

This situation is overturned during the second period as shown in the right part of Figure 1. Adult poverty has remained the same in 2011 compared to 2006 (their TIP curves, not reproduced here, completely overlap). But child poverty has become significantly lower than adult poverty in all its dimensions in 2011. The comparative situation of child poverty had become



The black solid lines represent the TIP curves for children. The dashed red lines corresponds to the adult TIP curves.

Figure 1: The modified contrast between child and adult poverty between 2006 and 2011

really shocking by 2006. In reaction, a new enhanced child benefit system for low-income families was introduced in 2005 (see e.g. Bruckmeier and Wiemers 2012 and appendix B). We see its effects progressively spreading, as at the end of 2011 child poverty has tremendously decreased compared to adult poverty and that in all its dimensions. Because family composition should not have changed too much over the 10 years of our sample, we can conclude that this huge drop in child poverty could be attributed to the change in family allowances, adult poverty remaining the same between 2006 and 2011.

This contrasting portrait of child and adult poverty can be confirmed with formal TIP dominance tests as reported in Tables 1 and 2. With an extended sample period compared to that of Corak et al. (2008), we find that the evolution of poverty has concerned mainly child poverty, while there was no significant change in households of adults without children. Table 1 show

Table 1: Probability of TIP dominance for current adult poverty

	TIP dominance				Lower incidence			
Year	2002	2006	2007	2011	2002	2006	2007	2011
2002	-	0.315	0.297	0.198	-	0.994	0.999	0.960
2006	0.221	-	0.415	0.228	0.006	-	0.839	0.302
2007	0.058	0.193	-	0.075	0.001	0.161	-	0.083
2011	0.391	0.499	0.460	-	0.040	0.698	0.917	-

Each line represents the probability that there is less poverty in the corresponding year than in the year given in column. The first panel corresponds to TIP dominance (intensity and inequality) while the right panel indicates the probability of lower incidence.

that there is no TIP dominance for any date for adult current poverty and we have also checked that those curves are never statistically different even if there are significant differences for poverty head-counts. With Table 2, we compare adult and child TIP curves. In 2002 and 2006, there is less poverty head-count for adults than for children, but there is no TIP ordering. So the portrait of child poverty during this period is more complex than what described in Corak et al. (2008). Over the second period, child poverty decreases regularly compared to adult poverty so that we have both TIP dominance and less poverty incidence for the children in 2011. We have also tested that TIP curves of adults and children are always statistically different.

Table 2: Probability of TIP dominance for current poverty between adult and children

	TIP dominance				Lower incidence			
Year	2002	2006	2007	2011	2002	2006	2007	2011
Adult	0.000	0.002	0.000	0.000	0.994	1.000	0.477	0.001
Child	0.516	0.001	0.872	1.000	0.006	0.000	0.523	0.999

Each column represents the probability that there is less poverty for the category indicated in line. The first panel corresponds to TIP dominance (intensity and inequality) while the right panel indicates the probability of lower incidence.

D Chronic poverty and the East-West contrast

If we now turn to adult chronic poverty and the TIP curves displayed in Figure 2, the situation is totally different. During period I, the rate of adult

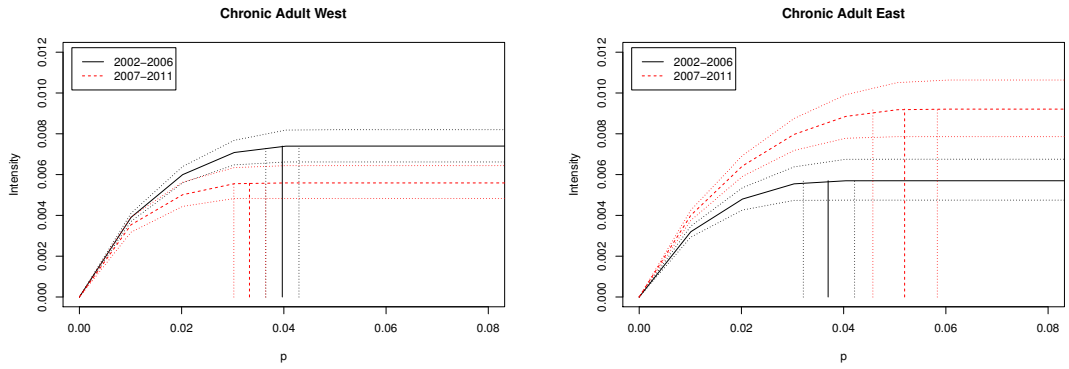


Figure 2: The West-East contrast of chronic adult poverty

chronic poverty is lower in the East than in the West with a TIP dominance probability equal to 0.981 (see Table 3). During period II, adult chronic poverty becomes significantly lower in West Germany than in East Germany with a probability of TIP dominance equal to 0.954. This is because chronic poverty has increased in the East (the probability of TIP dominance of the first period over the second is 0.981). While it has significantly decreased in West Germany (the probability of TIP dominance of the second period over the first is 0.927). We can conclude that there are still large differences between the West and the East part of Germany for adults. The question of chronic poverty was very well treated for children in both regions of Germany by the redistributive system and convergence was reached. We detected a

Table 3: TIP dominance test for adult chronic poverty between West and East Germany

		West		East		West		East	
		I	II	I	II	I	II	I	II
West	I	-	0.007	0.000	0.701	-	0.012	0.224	0.999
	II	0.927	-	0.108	0.954	0.988	-	0.846	1.000
East	I	0.981	0.450	-	0.999	0.776	0.154	-	0.999
	II	0.030	0.000	0.000	-	0.002	0.000	0.000	-

Each column represents the probability that there is less poverty for the category indicated in line. The first panel corresponds to TIP dominance (intensity and inequality) while the right panel indicates the probability of lower incidence. Period I corresponds to 2002-2006 and Period II to 2007-2011.

break in the data around 2006 which can be due to the effect of the Hartz plan. The purpose of the Hartz plan (see appendix B) was to bring back poor people to the labour market. Indeed, adult poverty was reduced in West Germany. But the effect of the Hartz plan was devastating for adult chronic poverty in East Germany. This, of course, deserves more investigation.

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