

Creative destruction in the Lithuania's post-socialist manufacturing sector: skill-biased technological change

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Labour markets in CEE countries during the transition period

After separating from the Soviet influence many CEE countries changed on an unprecedented scale, transforming from planned to market economies

This period (specifically from early to late 90s) for CEE countries was also characterised by:

- Bankruptcies of many publicly owned enterprises and large scale privatisation
- Substantial shift in the structure of employment from low skilled to high skilled workers (Havlik, 2001)
- A rise in wage inequality, quickly reaching Western European levels (Rutkowski, 1996)

Several explanations were proposed to explain these shifts, including: decentralisation of wage setting (Rutkowski, 2001), destruction of over-manned positions (Loecker and Konings, 2006), and decrease of the number of highly educated graduates (Esposito and Stehrer, 2008).

However, the most likely culprit behind these shifts was technological changes (Esposito and Stehrer, 2008).

Skill-biased technological change (SBTC)

Technological change that leads to changes in skill demand was named skill-biased technological change (SBTC)

Throughout the years many researchers used SBTC to explain the shifts in labour that happened in developed countries in the 70s-00 (e.g. Berman et. al., 1998; Sevinc, 2017; Tarjáni, 2004)

Though it was much more rarely applied to explain similar shifts in CEE

Hence, to fill in the gap in the literature, we explore if SBTC can explain the shifts that happened in Lithuania's manufacturing subsectors, which received the largest hit during the transition.

Drivers of skill-biased technological change

The most widely named factor that gave rise to the SBTC is the inherit skill-bias of technological changes, and specifically the invention of computers (Card and DiNardo, 2002; Goldin and Katz, 2008).

Though some criticized SBTC:

- Goldin and Katz (2008) stipulated that just as important as technological change is the initial number of high-skilled labour
- Autor et al. (2003) found that technological change often has a polarising effect on labour

This indicates that technological shifts not always lead to skill-biased technological change.

Lithuania during the transition

During the transition Lithuania went through typical changes for CEE countries, which can be defined as creative destruction:

- **There was widespread layoffs as companies were going under**
- **From 1995 to 2004 the number of employees in the manufacturing subsectors was steadily dropping at around 3.2% annually**
- **The average wage was growing at a round 11.7%, though if we only look at how wage changed after 1999, when the inflation became relatively stable, the wage only grew by 4.2% annually**
- **Industrial production grew, on average, by 15% annually**

Estimating SBTC

Researchers use one of two proxies to estimate SBTC:

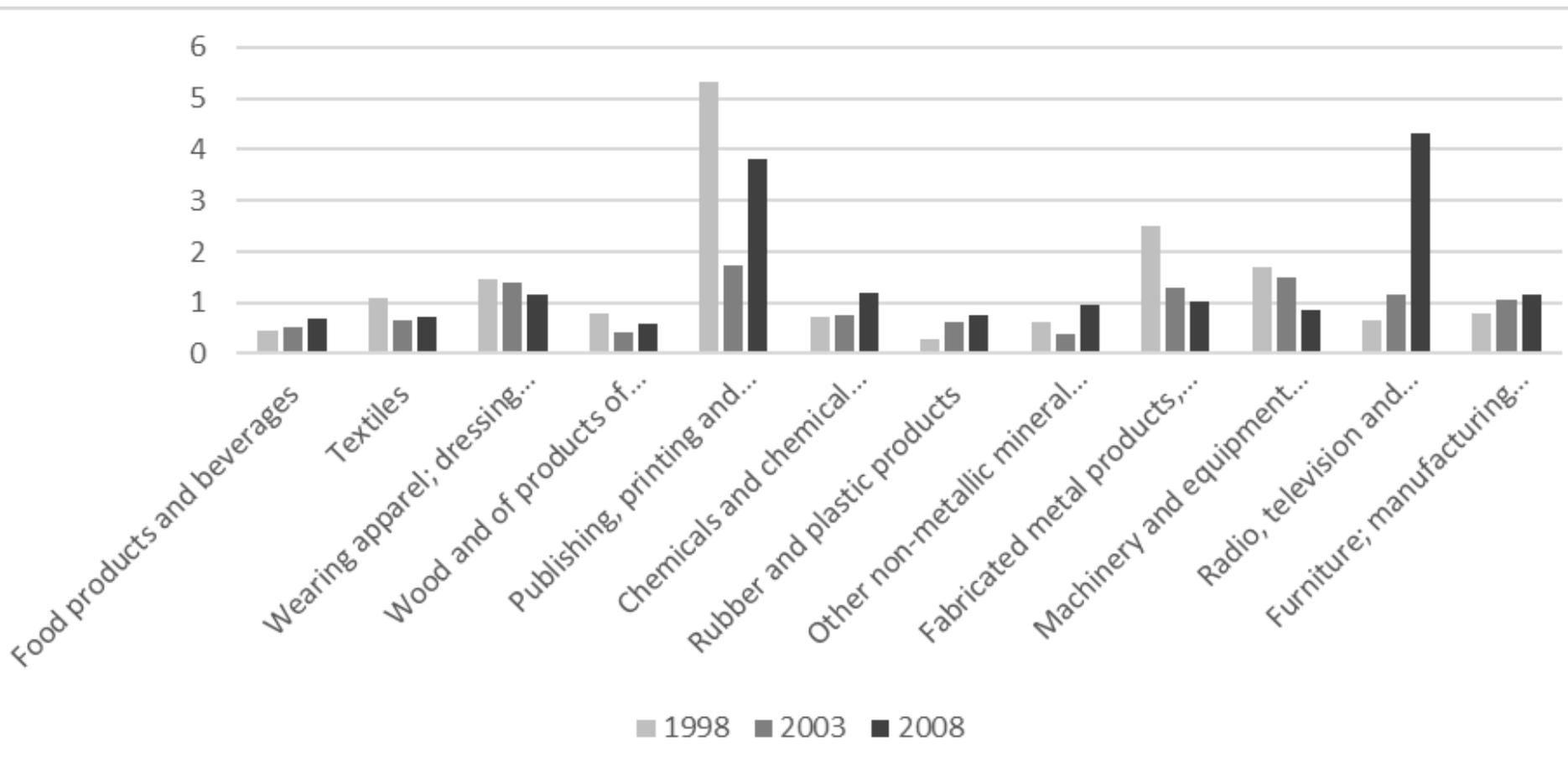
- **Wage ratio of high/low skill individuals (Nickell and Bell, 1996; Greenan et. al., 1998; Esposito and Stehre, 2008)**
- **Ratio of high/low skill employees (Katz and Murphy, 1992; Beudry and Green, 1998; Berman et al., 1998).**

In the research we use the ratio of high to low skill due to limited available data and strong inflation in Lithuania in the early 90s

Highly skilled individuals - those belonging to the first three ISCO-88 occupations, while low are those belonging to the bottom two.

Occupations is used rather than education or wage as it takes in to account skills used on the job and does not treat skills as static

Ratio of high to low skilled individuals



Estimating Technology

Due to lack of data we have to proxy technological change through the export upgrading of each manufacturing subsector

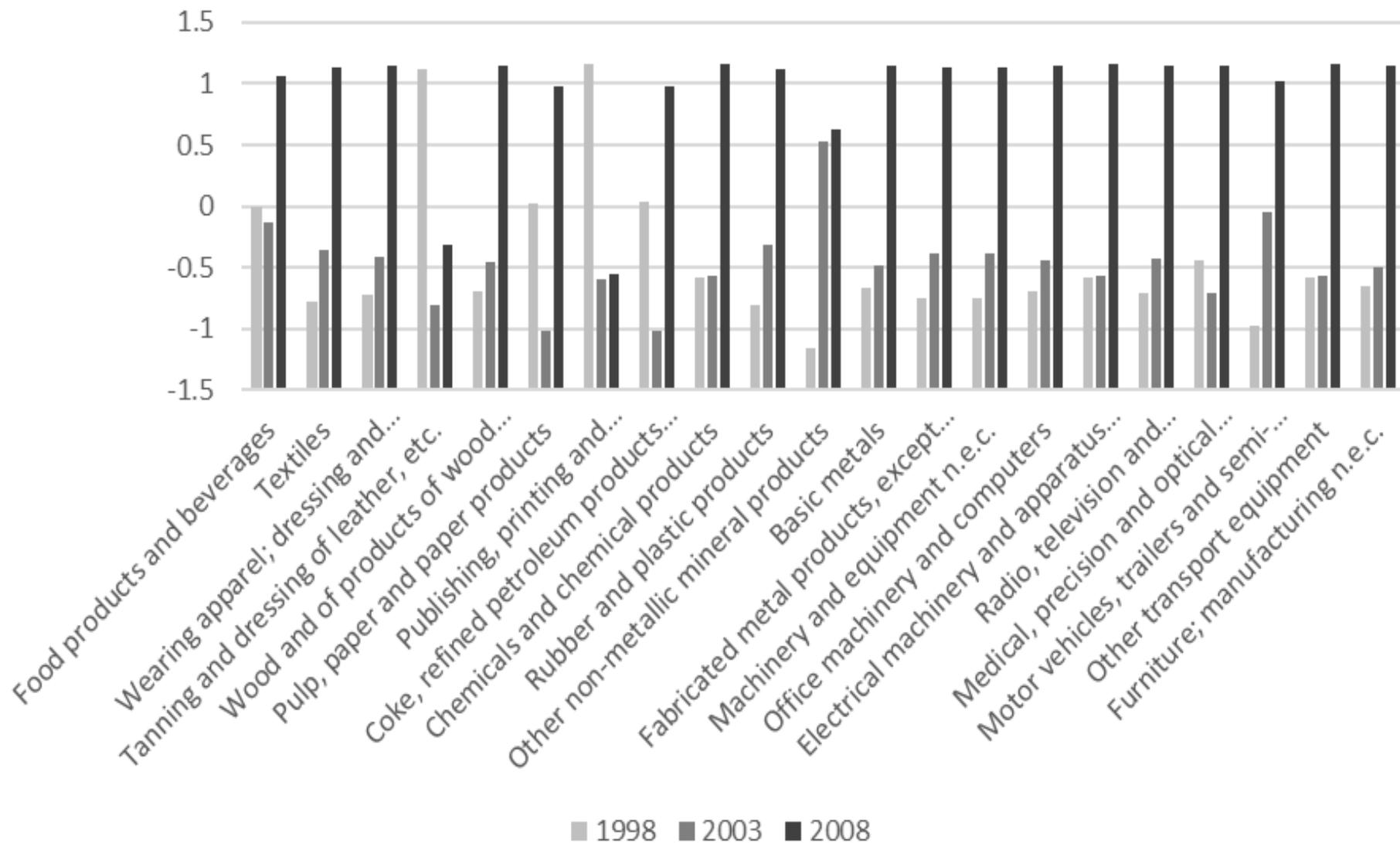
Export upgrading – by how much the average unit price of an export increased to EU-15 countries

Logic of this proxy is that quality of exports is dictated by increase in productivity, while change in productivity is dictated by technological and skill improvements

This creates a issue that export upgrading also captures changes in skills

To mitigate it, in the research we will control for skill change through change in (CPI adjusted) wages

Normalised export quality in different sectors and in different years



Methodology

Presentences of SBTC will be estimated by looking if we can explain the changes in the ratio of high to low skilled individuals by technological change from 1998 to 2008

This is done by using random effects regression, which was chosen as it takes in to account for the possible differences between subsectors

The regression equation will also include several control variables: GDP of a sector, number of employees, average age, etc.

SBTC in Lithuania I

Table 1. Random-effects panel regression equation on the ratio of high to low skill individuals in a sector (1998-2008)

	Coefficients	Standard error	z	p-value
Constant	43.5210	58.6524	0.7420	0.4581
ΔExport Quality	0.00219	0.00109	2.013	0.0441**
ΔNumber of employees	0.00719	0.00798	0.9018	0.3671
ΔGDP	-0.00017	0.00016	-1.047	0.2950
Average age	0.70048	0.06421	1.091	0.2753
Joined the EU (2004)	-0.02976	0.10462	-0.2844	0.7761
Year	-0.02260	0.02972	-0.7606	0.4469

N = 132

Table 2. Random-effects panel regression equation on the ratio of high to low skill individuals in a sector (with wage; 1998-2008)

	Coefficients	Standard error	z	p-value
Constant	44.4494	60.2803	0.7374	0.4609
ΔExport Quality	0.00216	0.00107	2.029	0.0424**
ΔCPI adjusted wage	0.00002	0.00006	0.2644	0.7915
ΔNumber or employees	0.00688	0.00845	0.8149	0.4151
ΔGDP	-0.00019	0.00017	-1.118	0.2636
Average age	0.07021	0.06580	1.067	0.2860
Joined the EU (2004)	-0.02906	0.10907	-0.2664	0.7899
Year	-0.02307	0.03055	-0.7551	0.4502

N = 131

SBTC in Lithuania II

Table 3. Random-effects panel regression equation on the ratio of high to low skill individuals in a sector (only low- and medium low-tech manufacturing sectors)

	Coefficients	Standard error	z	p-value
Constant	57.4426	48.131	1.193	0.2328
Δ Export Quality	0.00257	0.0005	4.754	<0.01***
Δ Number of Employees	-0.00120	0.0096	-0.126	0.8999
Δ GDP	-0.00001	0.0001	-0.080	0.9362
Average age	0.00736	0.3164	0.233	0.8160
Joined the EU (2004)	0.10995	0.0786	1.398	0.1620
Year	-0.02831	0.0243	-1.165	0.2439

N = 99

*** indicates a statistical significance of 0.01

Note 1: No autocorrelation or collinearity issues were present in the model

Note 2: Robust HAC standard error was applied to control for heteroskedasticity, which was presented in the data

Note 3: The regression included the following manufacturing sectors: (i) food products and beverages, (ii) textile, (iii) wearing apparel, (iv) wood products of wood and cork, (v) publishing, printing, and reproduction of recorded media, (vi) rubber and plastic products, (vii) other non-metal mineral products, (viii) fabricated metal products, except machinery and equipment, and (ix) furniture.

Conclusions and future work

The results imply that there was SBTC in Lithuania during the transition, though this conclusion is not strong due to a relatively small sample size

SBTC was stronger in low skilled industries

Future work will focus on finding the drivers behind SBTC by looking at birth and death of enterprises during this period

That is, we will explore if industry evolved through restructuring or by injection of new blood from newly formed companies

