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Services Policy Reform and Manufacturing Employment: Evidence from Transition Economies

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Abstract

Policy reforms targeting the services sectors are a neglected dimension of the process of structural transformation and economic development. The effects of such reforms on employment across industries as a function of their use of services as intermediate inputs are theoretically ambiguous and remain largely understudied. This paper uses sector-level data for 24 transition economies for the 1990-2012 period to assess the impacts of services policy reforms on downstream manufacturing employment. We find a negative effect of services reforms on manufacturing sector employment. This is mostly associated with the process of transition to a market-based economy. Controlling for transition-specific dynamics, the data suggest a neutral effect of progress towards adopting "best practice" policies for upstream services on employment in downstream manufacturing. Furthermore, in line with the extant literature, we confirm that services policy reforms enhance productivity of downstream manufacturing industries. Finally, we find that the negative effects on downstream employment are mitigated in countries with better economic governance and human capital.

Keywords: services policy; employment; transition economies
JEL classification: F16; F66; J23; P21

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1 Introduction

The role of services in economic development has been attracting increasing attention (Sáez et al., 2014; Fontagné and Harrison, eds, 2017). A rapidly growing strand of the literature on services is concerned with the aggregate productivity effects of service sector performance. This has shown that services performance matters for firm-level competitiveness (productivity) in all sectors because many services are inputs into production, and many firms rely on a wide variety of service inputs that are sourced from outside suppliers. Of particular interest has been to better understand the effects of services policies on economic performance. Numerous empirical papers have analyzed the impact of services policies on economic performance, including trade and investment-related policies, on the productivity and/or export performance of downstream industries.[1]

Less attention has been given to empirical assessment of how (changes in) services trade and investment and related regulatory policies impact on employment in manufacturing sectors. This paper seeks to partially fill this gap with a focus on the experience of transition economies, thereby contributing to the literature on structural transformation and to the analysis of the effects of service sector policies. The paper complements the extant literature on productivity effects of services policies as well as studies of the employment effects of services offshoring. The latter strand of the literature identifies different theoretical channels with ambiguous predictions regarding the effects of services offshoring on employment. On the one hand, offshoring lowers input prices and increases profits of downstream firms, in turn potentially increasing manufacturing production and labor demand. On the other hand, higher quality or cheaper service inputs may substitute for labor used in production, leading to a decrease in labor demand (Amiti and Wei, 2006; Milberg and Winkler, 2010b and Winkler, 2010).

[1] Firm-level analyses of productivity effects include Arnold et al. (2008, 2011); Fernandes and Paunov (2011); Forlani (2012); Duggan et al. (2013); Bas (2014); Hoekman and Shepherd (2015) and Arnold et al. (2016). Studies using sector-level data include Barone and Cingano (2011); Bourlès et al. (2013) and Beverelli et al. (2017). Analogous mechanisms have been studied for trade policies (import tariffs) and/or product market regulations affecting tangible goods (non-services) that are used by downstream industries (see for instance Amiti and Konings, 2007; Goldberg et al., 2010; Topalova and Khandelwal, 2011; Estevadeordal and Taylor, 2013; Bas and Causa, 2013; Ahsan, 2013; Bas and Strauss-Kahn, 2015; Halpern et al., 2015; Blonigen, 2015; De Loecker et al., 2016).

Consistent with the theoretical ambiguity, the results of empirical analyses are mixed. Amiti and Wei (2005) find a positive correlation between services offshoring and employment in the UK between 1995 and 2001. Focusing on US sector-level data Amiti and Wei (2006) identify a negative effect of services offshoring on employment, using disaggregated data (450 sectors). This negative impact vanishes if a less disaggregated sector classification is used, suggesting that there is sufficient growth in labor demand in sub-sectors within these broader categories to offset the negative effect. In the case of Germany Schöller (2007) finds a negative impact of services offshoring on low-skilled labor in manufacturing sectors for the 1991-2000 period, as does Winkler (2010) for the period 1995-2006. Milberg and Winkler (2010a) and Milberg and Winkler (2015) extend this analysis to OECD countries and show that negative impacts are attenuated by the existence of labor market institutions that reduce economic insecurity.[2]

In this paper we build on this literature but rather than focusing on the impact of specific decisions by firms/sectors (offshoring), our interest is in the effects of services policies. To that end we use a simple conceptual framework to consider the potential linkages from upstream services policy to downstream manufacturing employment. On the one hand, pro-competitive policy reforms should result in more efficient services suppliers, providing downstream manufacturing sectors with the opportunity to access cheaper or better services inputs, resulting in potential positive effects on the scale of downstream production and thus labor demand (a 'scale' effect). On the other hand, sectors may respond to reforms that improve the availability and quality or prices of services by outsourcing provision of services, with an associated negative impact on workers that previously performed these services activities in house (a 'substitution' effect). These mechanisms give rise to a theoretically ambiguous relationship between pro-competitive upstream services reforms and downstream manufacturing employment, making this essentially an empirical question. In addition to this general ambiguity, in the case of the transition economies that are the focus of our analysis, it is important to recognize that services reforms are part of a broader process of transformation that will affect

[2]Other research on the effect of services offshoring on productivity includes Görg and Hanley (2003) and Görg et al. (2008) working with plant-level data. Wright (2014) provides a theoretical analysis of the effect of (non services-specific) offshoring on employment. The structure and predictions of the model are in line with the services-specific mechanisms in the papers discussed in the text. Related to that, Bamieh et al. (2017) discuss similar mechanisms and find that higher services input intensity in US manufacturing sectors attenuates the local employment negative response to increased export pressures from China.

the empirical relationship of interest. We explicitly account for transition-specific mechanisms in our conceptual framework.

We construct a measure of services policy that captures the relationship between upstream services and downstream manufacturing. Our composite indicator of upstream services reform is consistent with the measures used both in the input-tariff literature (see of instance Amiti and Konings, 2007) and in studies that assess the effect of upstream services related policy on downstream productivity (see among others Arnold et al., 2008; Barone and Cingano, 2011; Arnold et al., 2011). We follow the latter strand of research and construct an aggregate composite indicator of policy towards producer services (transport, telecommunications and financial services) and utilities sectors. While combining utilities and producer services is consistent with the existing literature and allows to better capture the full scope of policy reforms that impact on products used as inputs by downstream sectors, we recognize that this lumps together 'input' sectors that have different dynamics. In part this is because utility services providers produce and distribute physical goods (electricity, gas, water) that are not produced in-house by manufacturing firms, and in part this is because of differences in market structure, ownership, and control (regulation) of utilities. We therefore consider the potential heterogeneity across upstream services sectors in our analysis.

We find that reforms of policies towards upstream services sectors decrease downstream manufacturing employment by a sizeable amount. However, when the contribution of transition-specific forces is minimised in the data, our estimates suggest that the scale effect tends to fully compensate the substitution effect of services reform, resulting in broadly neutral impacts on downstream employment. Our analysis also confirms the results in the extant literature regarding a positive effect of upstream services reforms on downstream productivity. Moreover, we also find that differences in economic governance (rule of law, control of corruption and regulatory quality) impact on the employment effects of services policy reforms. We argue that the quality of economic governance, as opposed to more narrow measures of employment protection used in the offshoring literature by Milberg and Winkler (2010a) and Milberg and Winkler (2015), may shape the effect of services policy reforms by affecting incentives to invest and expand manufacturing output.

Our study also adds to the broader literature on the effect of reforms in transition economies and the question whether countries that pursued deeper reforms

performed better than average. Studies on this subject mostly span country-level analysis, with mixed results regarding the effect of reforms on economic growth (see for instance the survey of empirical evidence in Falcetti et al., 2006). We make two contributions here. First, in assessing the impacts of reforms we focus on the more specific upstream-downstream channel, which has been recognised in the literature as a key element for the positive economic effect of economic reforms. Second, because we are able to exploit the heterogeneity across manufacturing industries, our empirical specification allows estimation under weaker identifying assumptions than most previous studies through country-year fixed effects. This mitigates potential endogeneity problems that may arise, e.g., if reform implementation is a function of the state of the overall economy.

The rest of the paper is organised as follows. Section 2 provides the conceptual framework. Sections 3 and 4 present the empirical model and the data, respectively. The main results are discussed in Section 5 while Section 6 reports extensions to the core analysis and further robustness checks. Section 7 concludes.

2 Conceptual framework

We start our analysis by developing a simple conceptual framework to guide the subsequent empirical investigation of the linkages between upstream services reforms and downstream employment in manufacturing. After discussing a number of mechanisms which are likely to govern our relationship of interest in any empirical setting, we identify a number of features that are specific to the transition process and thus to our sample of countries.

2.1 General mechanisms

The services reforms that are the focus of analysis in what follows are pro-competitive in nature, comprising reductions in restrictions on international trade and inward foreign direct investment (FDI), the removal of barriers to entry for private firms and more generally the introduction of commercial freedoms, and actions to establish or strengthen regulatory regimes and implementing institutions. The policy indicators we use have been developed by the European Bank for Reconstruction and Development (EBRD), and measure the distance between

prevailing policies in a given year with what is deemed to constitute good (best) practice. They are unique in being available on an annual basis starting in 1990.[3]

Other things equal, movement in the direction of better economic governance and regulatory practices is expected to result in cheaper and/or better (both in terms of quality and variety) services inputs available for downstream sectors (Barone and Cingano, 2011; Bourlès et al., 2013).[4] Assuming this is the case, services reforms may impact on manufacturing employment through different potential channels. Under the standard case of imperfect competition, improved access to cheaper or higher quality services inputs may increase profitability in downstream sectors (De Loecker et al., 2016). Higher profit margins, in turn, may result in an expansion in the scale of production, through lower output prices or higher investment. This positive scale effect is likely to be associated with an increase in labor demand of the downstream sectors. We denote this positive link between upstream services reforms and downstream manufacturing employment as the 'scale effect'.

Alternatively, access to more efficient and technologically-advanced producer services may lead to outsourcing of non-core services activities previously done in-house. In this case there will be a reallocation of services workers from downstream manufacturing to upstream services sectors, with a negative effect on employment in manufacturing (Francois, 1990). Reforms that involve the removal of services trade barriers may also lead to services offshoring in addition to domestic outsourcing. If so, there might be direct replacement of domestic workers providing services (whether in-house or by specialized services firms) by more efficient or less expensive foreign workers employed abroad (these are discussed by Amiti and Wei, 2005, 2006; Winkler, 2010). We characterize such negative relationships between upstream services reforms and downstream manufacturing employment as the 'substitution effect'. This substitution effect is likely to depend on the characteristics of the upstream sector and to be less salient for utilities than for producer services. It is plausible that workers in manufacturing sectors performing services activities such as transport or professional services can be

[3] A detailed description of the sector-specific policy and institutional indicators reported in the EBRD Transition Indicators Database is provided in Appendix C.

[4] These are also the standard effects hypothesized in analyses of liberalization of import tariffs on goods that are used as inputs (see of instance Amiti and Konings, 2007; Topalova and Khandelwal, 2011; Halpern et al., 2015). As already noted, domestic reforms as captured by the EBRD indicators include trade policy aspects. Moreover, for many services sectors, domestic regulatory restrictions represent de facto trade-restrictions (Crozet et al., 2016). For these reasons, we can expect strong similarity between the services policy changes that are the focus of our analysis and investigations that focus on the effects of liberalization of tariffs on intermediate good imports.

substituted by workers employed in domestic or foreign services providers. Manufacturing firms can be expected to have fewer workers employed to provide the products produced by utilities. However, the substitution effect may still very well apply to activities linked to the connection, maintenance and repair of utility services provided by utility companies that are offered alongside the tangible products (energy, gas, water) sold to downstream manufacturing sectors.

Overall, the offsetting impacts that arise as a result of the scale and substitution mechanisms make the net effect of upstream services reforms on manufacturing employment unclear.

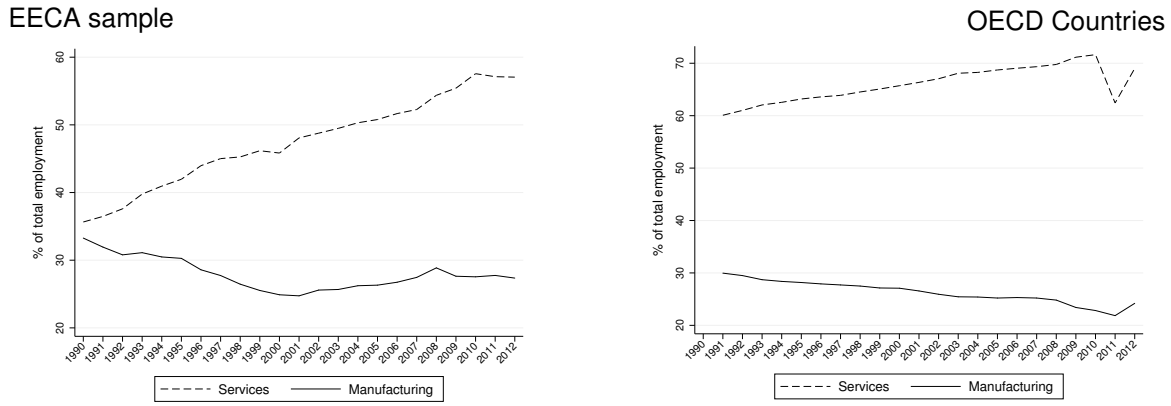
2.2 Transition-specific mechanisms

Our sample of Eastern European and Central Asian (EECA) transition economies implies that additional mechanisms need to be considered in the assessment the causal effect of services reforms on manufacturing employment. Transition-specific, idiosyncratic factors that will not apply to market economies can be expected to influence the employment effects of services policy reforms.

The most important of these factors is that in transition countries policy reforms occurred in a setting where domestic services sectors were rather embryonic and/or stagnant. The share of services in GDP was invariably substantially below that observed in market-based economies with similar levels of industrial development, educational attainment and technical capacity. Reforms to open the economy, remove price and other controls and to permit entry into services activities triggered a rapid expansion of service industries with an associated increase in demand for workers in services sectors. Figure 1 illustrates this feature of the transition process. In the early 1990s the share of services in total employment in our sample was around 35%, as opposed to 60% on average in OECD member countries. During the two subsequent decades the share of services in total employment increased by 70% in our sample, as opposed to only 15% in OECD countries.

Clearly an increase in overall employment in services sectors was a basic feature of the transition process, reflecting a mix of new entry and investment in services activities. In this context, services reforms are likely to generate a more pronounced shift of services workers from downstream manufacturing to rapidly

Figure 1: Services and manufacturing employment shares



Notes: 'EECA sample' refers to the 24 countries in the Eastern Europe and Central Asia region covered in our empirical analysis. See Appendix A for a complete list of such countries. The employment share (% of total population) series are from the World Bank World Development Indicators. 'OECD countries' refers the the World Bank aggregate which covers all OECD economies.

growing services sectors. This transitions-specific mechanism might be responsible for the steeper decline in the share of manufacturing employment in transition economies for the first 10 years in our sample (see the left panel of Figure 1). Moreover, it is reasonable to assume that the initial stages of the transition processes involving large scale changes in the economic environment will swamp any potential positive downstream scale effect from access to (more) efficient services inputs. Finally, as has been documented in the literature, transition economies underwent "transformational recessions" (Kornai, 1994; da Rocha, 2015) that were associated with the breakdown of long-standing relationships and inter-sectoral linkages (Roland and Verdier, 1999) reducing the contemporaneous efficiency gains of reforms.

A second complication that is specific to the transition context is that changes in policies often led to hard budget constraints and cost-reflective price-setting, which could lead to increases in prices of some inputs. If price controls and more generally non-market-based allocation of resources under central planning led to under-pricing of services inputs, the transition process will be associated with rising prices to reflect actual costs and market values. This was the case in particular for the outputs of utilities in many transition economies, which often were effectively provided at subsidized rates for major manufacturing industries under central planning. Utilities sectors are characterized by initial low values of the EBRD reform indicators, reflecting monopoly/State ownership and non

cost-reflective tariffs (prices), cross-subsidization and soft budget constraints (see Gray, 1995; Freund and Wallich, 1997; Stern and Davis, 1998, for detailed discussions of utilities markets reforms in transition economies).[5] Insofar as transition was accompanied by increases in input costs for manufacturing industries that could not be passed on to customers, policy reforms would tend to increase costs, with a negative effect on output and employment.

All transition-specific mechanisms imply a negative effect of upstream services reforms on downstream manufacturing employment. More precisely, they tend to impose an additional negative weight on the net effect of policy reforms both because of the dynamics characterizing the early transition stages in the 1990s (corresponding to the early transition stages), and because of the effects of pro-competive reforms in the utilities sector. Overall, considering both general and transition-specific mechanisms, while the net effect of services reforms on downstream employment remains essentially an empirical matter, we would expect the scale effect to outweigh the substitution effect and the transition-specific effects in two cases: (i) when we consider time periods that do not include the years in which most of the transition process and related reforms occurred; and (ii) if we exclude utilities from the set of upstream services sectors. We explore both of these hypotheses in our analysis.

3 Empirical model

To estimate the impact of upstream services policy reforms on downstream manufacturing employment we construct a composite policy reform following a similar logic of that applied for in the input-tariff literature. More precisely we interact services policy indicators that vary at the time and country level with measures of services input intensity specific to each manufacturing sector. Summing across services sectors we obtain a composite reform indicator that varies at the country c, manufacturing sector i and time t level. This indicator, which will be be the

[5] While consistent time series data for energy producer prices in our sample of countries are not available before 2007, non-systematic evidence reported in various EBRD Transition Reports reveals a pattern of rising energy and utility prices associated with transition. EBRD (1996) notes that energy prices charged to producers in 1994 were relatively close to those in the EU for those economies that were already at an advanced stage of transition (primarily Eastern European countries and the Baltics), while they remained significantly lower in countries that were still at an early stage of transition (mainly CIS countries).

regressor of interest in our model, is defined as follows:

$$CREF_{cit} = \sum_{s} REF_{sct} \times w_{scit} \tag{1}$$

where REF_{sct} is the policy variable for services sector s in country c and w_{scit} is the measure of input intensity of services s into manufacturing sector i in country c. For the latter we use standard input-output technical coefficients. Finally we normalize the composite indicator to vary between 0 and 1 and we denote the normalized version by $cref_{cit}$.

This approach allows us to employ an exhaustive battery of fixed effects. Our baseline employment specification is given by the following equation:

$$l_{cit} = \beta cref_{cit} + \zeta_{ci} + \eta_{ct} + \theta_{it} + \epsilon_{cit} \tag{2}$$

where l_{cit} is the natural logarithm of employment in country c and manufacturing sector i at time t. While particularly demanding on the data, this specification controls for any observed or unobserved heterogeneity at the country-sector (ζ_{ci}), country-time (η_{ct}) and sector-time (θ_{it}) level. In particular, the model accounts for many of the determinants of employment which are normally used in empirical studies of industry labor demand (Amiti and Wei, 2005, Amiti and Wei, 2006 and Winkler, 2010). Indeed, shocks to a particular country or sector at any point in time that affect the supply of labor, the price of intermediate inputs (including wages), output volumes and production technologies are subsumed in the country-time and industry-time fixed effects. Moreover, the country-sector fixed effects absorb all the time invariant characteristics that are idiosyncratic to each single country-sector pair including country-specific endowments which affect the underlying long-run labor intensity of a country's sectors and, in turn, their employment levels.

Following Blonigen (2015), we first-difference the data by country-sector to control for country-sector fixed effects, as well as to mitigate time-series issues,[6] and estimate the following empirical model:

$$l_{cit} - l_{ci(t-1)} = \beta[cref_{cit} - cref_{ci(t-1)}] + \lambda_{ct} + \mu_{it} + \varepsilon_{cit} \tag{3}$$

[6]We estimate standard errors clustered at the country-sector level to make them robust to any remaining autocorrelation.

Several endogeneity concerns arise in estimating this model. First, there is a standard problem of endogeneity of the input-output component of our composite indicator with respect to its policy component: services input intensities in downstream sectors are likely to depend in part on services regulation. Moreover, a national industrial strategy aiming at employment expansion could potentially imply the reduction of services outsourcing to boost in house activities. This would cause a problem of reverse causation from employment levels to the input-output component of our regressor of interest. The most widely adopted solution to these types of problems is to use a reference country as the source of input-output data, with the underlying assumption that the input-output linkages in the reference country are a good proxy for technological relationships between sectors.[7] We adopt this standard approach, computing technical coefficients from the mid-1990s input-output matrix of the United States. We show in Section 6.3 that our results are robust to using country-specific coefficients.

Secondly, no fixed-effect solution is available for heterogeneity that has a country-sector-year nature and that could drive the relationship between employment in manufacturing and the policies affecting the services sectors. Two potential sources of omitted variable bias are output and wages. These variables are standard determinants of sectoral labor demand (a component of our dependent variable) and they are likely to reflect shocks that are not only country-time or sector-time specific (as is the case for other determinants of labor demand such as prices or technology shifters). Additionally they may be correlated with policy reforms in the services sector which can potentially affect the scale (output) and the labor skill composition (wages) in manufacturing industries. In order to account for omitted variable sources of endogeneity we augment the baseline specification with controls capturing the value of output and individual wages at the country, sector and time level.

Finally, a potential source of reverse causation is lobbying behavior, which may result in linkages between employment in manufacturing sectors and the policy component of our regressor of interest. In principle, employment may in part reflect the incentives of a given industry in a country/time period to lobby for policy reforms in the services sector. In a similar empirical framework to the one used here, Beverelli et al. (2017) use an instrumental variable approach to show that this potential source of endogeneity is weak and gives rise to negligible estimation

[7] Examples of relevant papers that adopt and discuss this solution are Rajan and Zingales (1998), Barone and Cingano (2011), Bourlès et al. (2013) and Beverelli et al. (2017).

biases when the dependent variable is a measure of productivity. In any event, we believe that lobbying incentives are more likely to be fixed in the short-run, reflecting long-standing relationships between the sectors and the political system. While this argument is less compelling in the case of our sample of transition economies, time varying shocks that originate from changes in the political system are captured by the country-time fixed effects.

4 Data

We use three distinct sources of information to construct the variables of our baseline specification (equation 2): (i) data on employment and other manufacturing sectors outcomes; (ii) measures of service sector policy reforms; and (iii) measures of the degree to which different manufacturing sectors source from the service sectors for which policies are being reformed.

The dependent variable (employment) comes from the UNIDO Industrial Statistics. This dataset contains information on output, value added, employment and wages for about 20 manufacturing industries per country. We also compute a measure of total factor productivity using this database.[8]

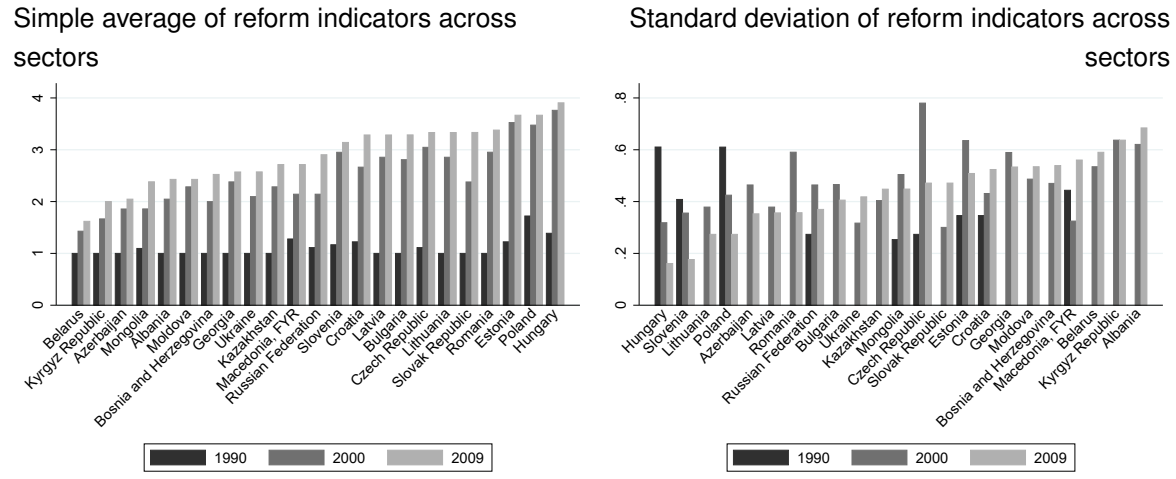
The key independent variable of interest (denoted as $cref$) combines service sector reform indicators with input-output coefficients. The I-O coefficients are obtained from the OECD STAN input-output tables. Unless stated otherwise, we use the mid-1990s US input-output table to compute the weights for all countries (i.e. we assume $w_{scit} = w_{s,US,i,mid90s}$ for all countries c). As discussed in Section 3, this practice is widespread in the literature following Rajan and Zingales (1998). It is motivated by concerns regarding the endogeneity of weights with respect to domestic regulations, and a presumption that the United States economy is relatively undistorted so that its input-output coefficients are more likely to reflect technological properties of different manufacturing industries as opposed to the distortionary effect of specific service regulations.

[8]Output and value added per worker are expressed in nominal terms (current US dollars). Note however that given that we include sector-year fixed effect we absorb sector-specific changes in prices to the extent that they are uniform across countries. This appears like a reasonable assumption considering the tradable nature of the manufacturing sector output. For a similar argument see Rodrik (2013). Our results are robust to the use of deflated series.

The indicators of service reforms are constructed by the EBRD, which has compiled these on an annual basis since 1989. The indicators are designed to monitor progress in policy reform in transition economies. They span a number of service sectors: financial services (banking and non-banking), transport (railways, roads), utilities (water, electricity) and telecommunications. The indicators take a value ranging between 1 (no progress since 1989) to 4.3 (adoption of best practices comparable to advanced OECD economies). From this database we construct policy reform indicators for four services industries, finance, telecommunications, transport and utilities.[9]

The left panel of Figure 2 displays the simple average policy index across the four service sectors and shows substantial variation in the pace of reforms across the 24 countries included in the estimation sample. While all countries started with similar scores in 1990, some countries such as Hungary, Poland or Estonia implemented rapid reforms during the 1990s while others such as Belarus and Ukraine undertook much more modest reforms. On average it appears that most reforms were implemented during the 1990s, with much more more limited improvements occurring during the 2000s.

Figure 2: Regulation over time and across countries



In addition to the cross-country variation in the pace and depth of reforms, countries also exhibit substantial cross-sector variation. This is evident from

[9]Details on the EBRD raw data as well as on the construction of the services specific indicators used in our analysis are provided in Appendix C.

the right-hand panel in Figure 2, which reports the standard deviation of the reform indicators across sectors for each country for three different years (note that the standard deviation is zero for many countries in 1990, a year in which market-oriented reforms had barely begun for most economies).

Table 1 reports the average annual growth rate in employment across all sample countries for each sector. While overall employment in manufacturing has declined (as is evident from Figure 1 above), there is a lot of variation across industries within manufacturing. The table confirms the fact that decline in employment was much stronger during the 1990s than the 2000s. We see for instance that the motor vehicle industry shrank by 9% a year during the 1990s but experienced positive growth during the 2000-2012 period.

Table 1: Average annual growth rate by sector

Period:	1990-2012	1990-1999	2000-2012
Basic metals	-2.74	-3.91	-1.91
Chemicals	-3.95	-4.94	-3.16
Coke, refined petroleum	-1.72	-0.47	-2.85
Communication	-0.8	1.27	-1.71
Electrical machinery	-3.28	-8.75	0.41
Fabricated metal products	-1.07	-7.65	2.99
Food, beverages	-1.64	-1.82	-1.52
Machinery and equipment	-6.6	-8.43	-4.88
Motor vehicles, trailers	-4.29	-9.12	1.06
Other mgf and recycling	-4.13	-9.61	-0.01
Other non-metallic prod.	-4.75	-7.78	-2.36
Other transport equipment	0.73	2.82	0.47
Precision instruments	-5.41	-14.94	0.79
Pulp, paper	-0.35	0.08	-0.56
Rubber and plastic products	1.17	-3.87	3.43
Textiles	-6.5	-7.41	-5.55
Wood products	-2.85	-1.98	-3.36
Across sectors	-3.43	-6.12	-1.44

Notes: Based on the estimating sample corresponding to 5,500 (sector-country-year) observations in 24 countries and 18 sectors over 23 years (1990-2012). Growth rates computed weighing observations based on their initial employment.

Table 2 reports the mean and standard deviations of the key dependent and explanatory variables for our estimating sample, both in levels and in first-differences (thus reflecting more accurately the variation we exploit to estimate our model).

Table 2: Descriptive statistics for dependent variable and main independent variable in first-differences

Variable	Mean	Std Deviation	Minimum	Maximum
l_{cit}	9.500	2.009	0.693	14.780
$cref_{cit}$	0.261	0.176	0	1
log output$_{cit}$	19.548	2.636	8.889	26.001
log wages$_{cit}$	7.923	1.258	-1.435	10.698
Var in first diff				
l_{cit}	-0.025	0.301	-3.989	3.332
$cref_{cit}$	0.010	0.019	-0.067	0.251
log output$_{cit}$	0.088	0.546	-3.601	6.185
log wages$_{cit}$	0.099	0.466	-5.618	5.963

Notes: Based on the estimating sample corresponding to 5,500 (sector-country-year) observations in 24 countries and 18 sectors over 23 years (1990-2012).

5 Results

5.1 Baseline estimation results

Results for the estimation of our baseline model are given in the first column of Table 3. The coefficient for $cref$ shows that services policy reforms have a negative and statistically significant effect on downstream employment. This result holds true - with minor changes in magnitude and within the standard levels of statistical significance - when the specification is augmented with the log of output (column 2), the log of individual wages (column 3) or both (column 4). Note that in these cases the signs of the coefficients for output and wages are consistent with the standard empirical results on labor demand, which is positively associated with production and negatively associated with the cost of labor.

As a first robustness check, in the last two models reported in Table 3 we augment our preferred specification of column 4 with imports at the manufacturing sector-country-year level.[10] This additional control is chosen to capture policy reforms that vary across downstream manufacturing sectors, countries and years. Absent any specific data source for manufacturing sector-specific reforms for our sample, we use trade developments as a proxy for the more general pattern of reforms across manufacturing sectors. Given that the structure of import protection

[10] Import data are from the World Bank WITS database (see Table A-1 in Appendix A). Given the use of country-time and sector-time fixed effects in the estimation there is no need to correct the import values - expressed in absolute terms - by scaling them with country or sector level characteristics varying across time.

Table 3: Effect of services reform on manufacturing employment

	Dep var: log employment					
	(1)	(2)	(3)	(4)	(5)	(6)
$cref$	-0.965**	-0.952**	-0.931*	-0.863*	-1.695***	-1.887***
	(0.481)	(0.457)	(0.489)	(0.470)	(0.600)	(0.679)
log output		0.342***		0.418***	0.483***	0.451***
		(0.0376)		(0.0311)	(0.0392)	(0.0452)
log wages			-0.132***	-0.328***	-0.235***	-0.225***
			(0.0426)	(0.0543)	(0.0477)	(0.0514)
log imports					-0.0221	-0.00969
					(0.0200)	(0.0231)
Observations	5500	5500	5500	5500	4449	3222
Adjusted R^2	0.135	0.327	0.149	0.405	0.442	0.402
Year coverage	1990-2012	1990-2012	1990-2012	1990-2012	1990-2012	1990-2007

Notes: All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects.
* p < 0.1, ** p < 0.05, *** p < 0.01.

implemented by transition economies under central planning involved extensive use of exchange controls, foreign currency rationing and quotas as opposed to tariffs, and the limited tariff data availability for the early transition period, we use import supply (an outcome measure) as a proxy for applied trade policy in our estimation sample. Note that limited trade data coverage at the industry level and directly compatible with ISIC Rev 3 classification, even though more widely available than tariff protection data, results in a reduction in the estimation sample of approximately 20% (see column 5). Column 6 further controls for the sector-country-year-specific policy responses to the global financial crisis by removing the years 2008-2012 from the estimation sample. In both cases the negative sign of the coefficient for the regressor of interest is maintained. The magnitude (in negative terms) as well as the statistical significance of the estimates increase,[11] confirming our preference for model 4 as generating conservative estimates while maximising the size of the estimation sample.[12] According to the estimated coefficient for $cref$ from column 4, an increase in the composite indicator of upstream policy reforms by one half of a standard deviation results in an

[11] Given that the estimated coefficients for the log of imports are not statistically significant, the increase in the magnitude and statistical significance of the $cref$ coefficients may be largely driven by the changes in the estimation sample.

[12] We have also estimated model 4 under the more restrictive country-level clustering of the standard errors. The point estimate for the coefficient of $cref$ remains within the 0.1 threshold of statistical significance.

average decrease of downstream manufacturing employment by 7.5 percentage points which is a sizeable negative effect.

5.2 Minimizing the role of transition-specific mechanisms

Qualitatively our results suggest that the scale effect of upstream services policy reforms fails to counterbalance the joint forces of the substitution effect and the transition-specific ones. In what follows we replicate our estimates in order to minimize the contribution of transition-specific mechanisms in determining the net employment effect of policy reforms. This allows us to approximate a 'normal' empirical context where the mechanisms at work are the general ones (scale versus substitution effect), thus improving the external validity of our econometric exercise. Guided by the discussion in Section 2.2, we look at the post-1990s period and at the role of producer services reforms excluding the utilities sector.

Table 4 replicates the analysis by estimating our preferred specification (column 4 on Table 3) separately for the first and second half of the 23 years of our sample.[13] Table 4 presents estimates for both the baseline equation and the model augmented with output and wages. In the two models corresponding to the first half of our sample (columns 1 and 2 of Table 4), the coefficient of the composite reform indicator is negative, statistically significant and slightly larger in size than is the case using the full-sample. For the second half of the sample period (columns 3 and 4) the coefficient remains negative but is smaller in magnitude and loses statistical significance.

These estimates show that the negative effect of services reforms is associated with the early stages of transition, after which the scale effect and the remaining forces of opposite sign tend to cancel out, making services reforms neutral from the point of view of downstream employment.

In the same spirit, the exercise reported in Table 5 unpacks the aggregate services bundle by distinguishing between reforms targeting producer services and those targeting the utilities sector. Technically, this corresponds to relaxing the assumption - implicit in the construction of our composite reform indicator in equation (1) - that the impact of policy reforms is homogeneous across the

[13] Setting the beginning of the second half at the year 2001 or 2002 does not affect the results.

Table 4: Effect of services reform on manufacturing employment in different time periods

Period:	1990-2001		2002-2012	
	(1)	(2)	(3)	(4)
$cref$	-1.098*	-1.095**	-0.411	-0.138
	(0.572)	(0.541)	(0.913)	(0.867)
log output		0.418***		0.426***
		(0.0455)		(0.0442)
log wages		-0.247***		-0.391***
		(0.0549)		(0.0759)
Observations	2357	2357	3143	3143
Adjusted R^2	0.131	0.402	0.120	0.403

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

upstream sectors we consider. To that end, we define four sector-specific composite reform variables as the product of the sector-specific policy reform indicator with the corresponding vector of input-output weights. Formally, for each sector s among utilities, transport, telecom and financial services we define

$$cref_{scit} = REF_{sct} \times w_{si} \tag{4}$$

Columns 1-4 of Table 5 report the estimation results when each of these sector-specific indicators is used to replace the aggregate variable $cref$.

The only sector-specific policy reform indicator for which the estimated coefficient remains significantly negative is for utilities (column 1). For transport services (in column 2) the magnitude of the estimate is reduced (in negative terms) and is not statistically significant. Moving to telecommunication (column 3) and financial services (column 4) the signs of the point estimates become positive, although the effects are also not statistically significant. If we use a version of $cref$ that accounts only for reforms in producer services (transport, telecommunications, financial services), we find that excluding utilities from the aggregate composite reform indicator, reduces the magnitude of the estimated coefficient by more than a half with respect to its value in Table 3 and is no longer statistically significant (column 5).

The results presented in Table 5 suggest that policy reforms targeting the utilities sector were particularly important for the negative downstream employment

Table 5: Heterogeneity across services sectors and the role of utilities

Period:	Whole sample					2002-2012
	(1)	(2)	(3)	(4)	(5)	(6)
$cref_{\text{utilities}}$	-0.832*					
	(0.481)					
$cref_{\text{tranport}}$		-0.353				
		(0.291)				
$cref_{\text{telecom}}$			0.0596			
			(0.238)			
$cref_{\text{finance}}$				0.118		
				(1.018)		
$cref$ w/out utilities					-0.367	-0.0466
					(0.339)	(0.525)
Control for output and wages	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5500	5500	5500	5500	5500	3081
Adjusted R^2	0.406	0.405	0.405	0.405	0.405	0.422

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

effect of services reforms. When utilities are excluded from the empirical exercise, the findings suggest once again that the scale effect of upstream policy reforms has the capacity to outweigh the other forces generating negative effects for downstream manufacturing employment.

Finally, column 6 replicates the estimation in column 5 using only the observations relative to the second decade of our sample. That should represent the empirical environment where transition-specific mechanisms are actually minimized as both the forces active during the early stages of transition and the idiosyncratic effect utilities sector reforms are excluded from the data. Once more, the point estimate is not statistically significant, pointing to the neutrality of upstream services policy reforms for employment in downstream manufacturing. This is likely to reflect the scale effect outweighing the substitution effect when the latter is not confounded with transition-specific dynamics that orient the effect of reforms toward a reduction of downstream employment.[14]

[14]The empirical pattern in Section 5.2 are robust to the inclusion of log imports in the set of controls and to the more restrictive clustering at the country level. Estimates are available upon request.

5.3 SERVICES REFORMS AND PRODUCTIVITY

In this section we complement the analysis of the downstream employment effect of services reforms with their impact on downstream productivity. The general result in the literature leads us to expect a positive effect of upstream liberalization on downstream sectoral productivity. We rely on the baseline model specified in equation (2) using a measure of productivity as dependent variable. The main potential sources of endogeneity are, mutatis mutandis, analogous to those discussed in Section 3. While we continue to use the US I-O coefficients to generate input intensity measures to minimise reverse causality issues, we do not include any additional control varying at the country-sector-time level. Our assumption is that the relevant variation in the key determinants of productivity such as R&D intensity is driven by either long-run characteristics (factor endowments, economic geography) or by shocks at the country or industry level (technology, political economy dynamics, etc.) and, therefore, is controlled for by the fixed effects.[15]

Our preferred measure of productivity is the natural logarithm of value added per employee (labor productivity). This measure has two advantages: it limits the extent to which the sample size is reduced (a decrease in the number of observations of some 20%), and it does not require structural assumptions for its empirical interpretation. We also construct a measure of total factor productivity (TFP) using standard accounting techniques. We use a Cobb-Douglas model, such that $\log TFP_{cit} = \log VA_{cit} - a \log L_{cit} - (1-a) \log K_{cit}$, where VA denotes real value added;[16] a is the sectoral share parameter set equal to 2/3 (as in Cipollina et al., 2012); L and K are respectively employment and the real capital stock. Following Levchenko et al. (2009), the series for capital is constructed using the standard inventory method, where the capital stock in year t is given by $K_{cit} = (1-d)K_{ci(t-1)} + I_{cit}$ with I real investment, the depreciation rate d set equal to 0.08 and the initial level of capital stock given by $K_{ci0} = I_{ci0}/d$.[17] The resulting

[15] The validity of this identification strategy is confirmed by the stability of the estimates for the employment model when moving from the baseline specification to that featuring country-sector-time controls (log output and log wages). A similar approach is adopted in Blonigen (2015) who uses a less demanding version of this empirical model (not including sector-time fixed effects) to investigate the impact of industrial policy in the steel sector on downstream sectors export competitiveness.

[16] Real value added is obtained by deflating the UNIDO value added series in US dollars by the (output-side) price level for the US with reference year equal to 2005. We use price data from the Penn World Table, version 8.1 (see Feenstra et al., 2015).

[17] As in Beverelli et al. (2017) we take I_{ci0} as the first non-missing datapoint in the real investment series starting from the 1960s. The series of real investment is constructed by deflating the UNIDO

TFP measure offers a more comprehensive perspective on sectoral productivity beyond value added per employee. However it entails a significant reduction in the size of the estimation sample and its empirical interpretation as the true sectoral TFP rests upon strong structural assumptions.[18]

The results reported in Table 6 indicate a positive effect of services sector reforms on downstream productivity. The magnitude of the positive coefficient in the model for labor productivity (column 1 of Table 6) is about twice that of the negative coefficient in the employment model (Table 3, column 4). This no doubt reflects a mechanical increase in labor productivity that is the counterpart of the reduction in the level of employment.

Table 6: Effect of services reform on manufacturing productivity

Dep var:	log labor prod	log TFP
	(1)	(2)
$cref$	1.796***	0.690**
	(0.675)	(0.347)
Observations	4420	2198
Adjusted R^2	0.200	0.128

Notes: All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects.
* p < 0.1, ** p < 0.05, *** p < 0.01.

The positive sign and the statistical significance of the productivity effect is confirmed by the estimated $cref$ coefficient in the TFP model (Table 6, column 2).[19] The magnitude of this coefficient implies that a one half of a standard deviation increase in the composite reform indicator is associated with an increase in TFP by 6.1 percentage points.[20] More generally, these results suggest that, even if services reforms do not trigger a net increase in downstream manufacturing

investment series with the (capital formation) price levels reported in the Penn World Table, version 8.1.

[18]Sample size reduction is due to the limited coverage of investment data for the countries and sectors in our sample. The most restrictive underlying assumption for the empirical interpretation of our measure as the true sectoral TFP is that of perfect competition in both the output and input markets.

[19]Beverelli et al. (2017) show that the quality of governance institutions impacts on the downstream productivity effects of services trade policy. The estimation sample for model 2 in Table 6 covers 17 countries including some with weak or fragile governance institutions such as Albania, Azerbaijan, Georgia and Mongolia. This makes the positive effect result fairly general and not completely driven by the average quality of economic governance in the subsample.

[20]This effect is computes using the standard deviation of $cref$ estimated on the baseline sample of 5500 observations and equal to 0.176. Notice that the same statistics is slightly lower (equal to 0.162) when estimated on the reduced sample of 2198 observations used in column (2) of Table 6.

employment for our transition empirical framework, downstream manufacturing productivity unambiguously benefits from pro competitive policy reforms in producer service sectors.

6 Extensions and robustness tests

In this section we extend the analysis with the objective of deepening our understanding of the anatomy of the negative nexus between upstream services reforms and downstream manufacturing employment in the context of our transition-specific empirical framework. We also provide here a number of tests for the robustness of the baseline negative effect.

6.1 Heterogeneous effects with country-level characteristics

Economic governance and human capital

Country-level heterogeneity in our sample permits analysis of whether and how the negative effect found in Section 5.1 changes if we differentiate across subsamples of countries based on broad indicators of the quality of economic governance and human capital. In principle, the role of governance institutions in shaping the employment effect of services reforms is ambiguous. On the one hand good institutions (high regulatory quality, control of corruption and rule of law) may support more rapid firm level adjustment to policy reforms. Good institutions can allow firms to substitute in-house activities with more efficient services coming from a reformed sector, minimising rigidities due to contractual inefficiencies or the need to confront distortionary special interests. Moreover, good institutions may permit a more rapid response of the services sector itself, enhancing the capacity to absorb workers from the adjusting downstream sectors. If so, such mechanisms may reduce the social costs of adjustment by manufacturing industries, amplifying the substitution effect. On the other hand, good institutions may complement policy reforms by helping to attract better quality services (and services providers) into the country (see Beverelli et al., 2017). More efficient services inputs are likely to help domestic manufacturing to specialize and expand the scale of pro-

duction.[21] This would result in a positive employment effect of services reforms by strengthening the scale effect.

Turning to the role of human capital, if - as suggested by recent empirical studies of services offshoring[22] - a reform-induced expansion in access to efficient producer services triggers a pattern of skill upgrading at the firm and industry level, countries with more skilled labor (higher human capital) may be able to better match reform-induced increase in demand for skilled labor, with a direct positive effect on manufacturing employment. This in turn would support profitability and further expand labor demand. Overall, high human capital endowments therefore should bolster the scale effect of services reforms on manufacturing employment.

As measures of economic governance we use three variables reported in the Worldwide Governance Indicators Database (World Bank), i.e. regulatory quality, control of corruption and rule of law.[23] As a proxy for human capital we take the gross enrolment ratio in secondary education for both sexes from the World Development Indicators (World Bank). For each moderating variable m we divide the estimation sample into two subsamples and compute the country-specific average of m across available years, obtaining the variable $\bar{m}$. We then divide all countries in two quantiles (LOW and HIGH), below and above the sample median of $\bar{m}$. For each subsample we estimate both the baseline specification and (for robustness purposes) the baseline model augmented with output and wages. Table 7 present the results.

With respect to the full-sample results reported earlier (Table 3), the negative employment effect of services reforms appears stronger when estimated for those countries with a lower level of economic governance or human capital (LOW quantile of the $\bar{m}$ distribution). It is also always statistically different from 0 at least at a 10% significance level. This result is robust to the inclusion of output and wages as additional controls. Conversely, when estimated for the subsamples corresponding to the high governance or high human capital countries (HIGH quantile of the $\bar{m}$ distribution), the effect of services reforms is attenuated in both its magnitude and statistical significance. In particular, the coefficient of $cref$ is always smaller (in negative terms) than the corresponding full-sample estimation and it is statistically

[21] See Francois (1990).

[22] See for instance Geishecker and Görg (2013).

[23] Data on these variables are available for all 24 EBRD countries in our sample for the following years: 1996, 1998, 2000, and 2002-2012.

Table 7: Effect of services reform on manufacturing employment at different levels of economic governance and human capital

Panel A	m = regulatory quality				m = control of corruption			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cref$	-2.338*	-2.363**	-0.598	-0.642	-2.354*	-2.399**	-0.524	-0.563
	(1.269)	(1.194)	(0.395)	(0.440)	(1.272)	(1.196)	(0.395)	(0.431)
log output		0.356***		0.573***		0.357***		0.572***
		(0.0310)		(0.0563)		(0.0310)		(0.0562)
log wages		-0.323***		-0.196**		-0.323***		-0.197**
		(0.0545)		(0.0863)		(0.0548)		(0.0860)
Observations	2490	2490	3004	3004	2475	2475	3019	3019
Adjusted R^2	0.103	0.341	0.225	0.561	0.103	0.342	0.225	0.560
$\bar{m}$ quantile	LOW	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH
Panel B	m = rule of law				m = human capital			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cref$	-2.570*	-2.737**	-0.782*	-0.527	-1.674*	-1.552*	-0.632	-0.167
	(1.315)	(1.202)	(0.416)	(0.468)	(0.900)	(0.880)	(0.569)	(0.470)
log output		0.344***		0.496***		0.379***		0.478***
		(0.0333)		(0.0451)		(0.0309)		(0.0628)
log wages		-0.192***		-0.455***		-0.311***		-0.302***
		(0.0505)		(0.0741)		(0.0584)		(0.0858)
Observations	2241	2241	3243	3243	2364	2364	3110	3110
Adjusted R^2	0.107	0.323	0.219	0.534	0.135	0.373	0.147	0.462
$\bar{m}$ quantile	LOW	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

different from 0 only for the baseline specification in the case when the moderating variable is the rule of law indicator (column 3 in Panel B). These results suggest that both high levels of economic governance and human capital reduce the negative effect of services policy reforms on manufacturing employment.

EU institutions

The transition economies in our sample comprise two groups, with one set of countries having gone through a process of accession to the EU and another that has not. The set of reforms required for integration into the EU is in large part designed to bring the institutional environment of a country closer to EU norms and standards for a wide range of policy areas, including the judiciary, the civil service (bureaucratic efficiency) and the enforcement of competition policy. A priori,

accession countries should be characterised by better governance and institutions than non-accession countries, with ambiguous implications for the the impact on the downstream manufacturing employment (as discussed above). Replicating the estimation of the baseline and control-augmented model on the subsample of countries that acceded to the EU in 2004 we find that the effect of services policy reforms on downstream manufacturing employment, while still negative and significant for the countries that did not join the EU in 2004, becomes statistically non-different from zero in accession countries.[24] Table 8 presents the results. The policy reforms implied by accession to the EU (for those joining in 2004) are associated with a smaller negative effect on downstream manufacturing employment (columns 3 and 4). This finding is in line with the results from considering the role of economic governance as measured by the indicators of regulatory quality, control of corruption and rule of law.

Table 8: Effect of services reform on manufacturing employment in 2004 EU accession countries

2004 accession:	No		Yes	
	(1)	(2)	(3)	(4)
$cref$	-1.525*	-1.389*	-0.959	-0.601
	(0.843)	(0.803)	(0.796)	(0.699)
log output		0.352***		0.606***
		(0.0311)		(0.0616)
log wages		-0.298***		-0.370**
		(0.0535)		(0.152)
Observations	3228	3228	2269	2269
Adjusted R^2	0.111	0.326	0.206	0.631

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

6.2 Lagged effects of services reforms

In this section we investigate the linkages between services reforms and manufacturing employment beyond the instantaneous impact estimated in Table 3. It is

[24] The countries that joined the EU in 2004 are Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Including in the accession group the countries that joined the EU in subsequent stages, i.e. Bulgaria (2007), Croatia (2013) and Romania (2007), does not change the results.

plausible that such inter-sectoral relationships - from upstream producer services to downstream manufacturing employment - would be active and evolve for more than one year. In order to test for the existence of non-contemporaneous effects of service reforms on downstream employment we include several lags of $cref$. Table 9 presents the results. The point estimates are negative for the contemporaneous change and the first lag and then turn positive. This suggests that the cumulated effect over time might be less negative than what our previous estimates suggested. However we note that the coefficients on lag values are very imprecisely estimated and always associated with p-values above 10%. We also remark that the contemporaneous effect becomes more negative when the lag values are included and that it remains rather stable, showing that the coefficient is robust to the inclusion of lags. Overall we find little support for the notion that longer run effects of policy reforms offset short-run negative impacts on manufacturing employment.

Table 9: Lagged effects of reforms

	Dep var: log employment	
	(1)	(2)
$cref$	-1.419**	-1.119**
	(0.573)	(0.551)
$cref(t-1)$	-0.155	-0.379
	(0.536)	(0.483)
$cref(t-2)$	0.174	0.382
	(0.443)	(0.444)
$cref(t-3)$	0.142	0.514
	(0.412)	(0.351)
Control for output and wages	No	Yes
Observations	5113	5113
Adjusted R^2	0.129	0.405

Notes: All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects.
* p < 0.1, ** p < 0.05, *** p < 0.01.

6.3 Further robustness checks

The robustness of the negative employment effect of our composite services reform indicator to alternative measures of services input intensity can be assessed by replacing the US I-O coefficients with coefficients derived from the US

Leontief inverse matrix. These capture, beyond the direct upstream-downstream connections, also the set of indirect relationships linking two sectors at any position in the supply chain.[25] Columns 1 and 2 of Table 10 show that taking these indirect linkages into account still results in a negative and statistically significant coefficient for the composite reform index $cref$. This holds for both our baseline specification and the model augmented with output and wages. The use of Leontief coefficients increases the magnitude of the estimates by between 50 and 75% compared to those reported in Table 3. This is consistent with a higher degree of input intensity (both direct and indirect) embedded in the Leontief weights.

To assess the validity of our identification assumption about the representativeness of US social accounting matrix and its capacity to capture the technological linkages between sectors rather than US-specific shocks we build an alternative version of the composite reform indicator using input-output coefficients derived from country-specific social accounting matrices. Conditioning on data availability limitations which significantly reduce the estimation sample,[26] the estimates in columns 3-6 of Table 10 confirm the negative and statistically significant employment effect of services reforms. This holds across both specifications and types of input-output coefficients. The magnitude of the effects is consistent with the estimates using US as a reference country: in case of the specification with output and wages, the use of country-specific weights increases (in negative terms) the coefficient on $cref$ by 15%.

Finally, to check whether our baseline results reflect the excessive influence of the country with the highest or lowest average policy reform value across services sectors (respectively Estonia and Bosnia Herzegovina) we alternatively exclude these countries from the estimation sample and assess how the resulting coefficients are affected. We replicate this exercise excluding one-by-one the sectors with the highest and lowest average value of services input use intensity (respectively manufacturing of non metallic mineral products - ISIC code 26 - and manufacturing of office, accounting and computing machinery, ISIC code 30). As shown in Table 11, the coefficients are robust to the exclusion of these extreme cases, that is, they remain negative and significant at the 5% level.

[25] See Appendix B for the derivation of different input-output coefficients.

[26] Country-specific matrices from OECD STAN database are available for only 11 of the 24 countries in our full sample: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey. We choose the mid 2000s as a reference period to maximize country coverage.

Table 10: Alternative services input intensity measures

IO weights in $cref$:	US leontief		country specific (tech)		country specific (leont)	
	(1)	(2)	(3)	(4)	(5)	(6)
$cref$	-1.473**	-1.532**	-1.306***	-1.014***	-1.360***	-1.424***
	(0.696)	(0.662)	(0.363)	(0.312)	(0.486)	(0.481)
log ouput		0.418***		0.577***		0.578***
		(0.0311)		(0.0569)		(0.0568)
log wages		-0.328***		-0.194**		-0.194**
		(0.0543)		(0.0877)		(0.0876)
Observations	5500	5500	2959	2959	2959	2959
Adjusted R^2	0.135	0.406	0.222	0.562	0.222	0.562

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 11: Influential observations

Omitting influential	countries	sectors
	(1)	(2)
$cref$	-0.964**	-1.438**
	(0.475)	(0.659)
Control for output and wage	Yes	Yes
Observations	5290	4883
Adjusted R^2	0.391	0.429

Notes: Dependent variable always equal to log employment. All models are estimated in country-sector first-differences and include country-time and sector-time fixed effects. Influential countries are defined as those with the highest and lowest average value of policy reform indicators across services sectors (respectively Estonia and Bosnia Herzegovina). Influential sectors are defined as those with the highest and lowest average value of services input intensity across services sectors (respectively manufacturing of non metallic mineral products - ISIC code 26 - and manufacturing of office, accounting and computing machinery, ISIC code 30). * p < 0.1, ** p < 0.05, *** p < 0.01.

7 Concluding remarks

In this paper we analyze the effect of services policy reforms on downstream employment in manufacturing. This is a subject of general interest that has not been the focus of much cross-country empirical research, in part because of lack of time series data on applied service sector policies for many countries. The performance of services sectors can have a significant impact on industries that use services as intermediate inputs. Our analysis is based on a panel of sector-level data for 24 transition economies for the 1990-2012 period. The focus on these countries is motivated in large part by the availability of annual time series data on applied services policies. The transition economies that are the focus of analysis

are in many ways sui generis, but for our purposes a key feature of these countries is that the EBRD has been compiling services sector-specific policy indicators for over two decades.

Our findings complement the literature that identifies positive productivity effects of pro-competitive services policy reforms by documenting, within the empirical context of transition economies, the existence of a negative relationship between services policy reforms that move countries towards what are regarded to be best practices and employment in downstream manufacturing industries. However, when transition-specific dynamics are identified and their contribution minimized in the data, the results suggest an empirical neutrality of upstream services liberalization for downstream manufacturing employment. We also find that the negative effect on manufacturing employment is mitigated or disappears for countries with high levels of economic governance and human capital, pointing to the importance of the broader business environment and investment climate in moderating the impacts of services policy reforms.

Our analysis indicates that services policy reforms are one factor explaining the declining share of manufacturing that occurred in the transition economies. Overall service sector employment grew rapidly following the demise of central planning. This structural transformation of the transition economies is not surprising, of course, given the distorted initial conditions that prevailed in these countries. Employment statistics for these countries show that the share of total employment in manufacturing initially declined for the group as a whole, and then gradually increased (see Figure 1 above). Moving towards best practice services policies was associated with an economically significant reduction of manufacturing employment, helping to explain the observed trend in sectoral employment shares. Our results suggest that at the aggregate level the potential positive scale effect of better access to services for downstream manufacturing industries is more than offset by incentives to outsource non-core tasks and the associated reduction in the workforce employed in manufacturing.

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APPENDICES

A APPENDIX TABLES

Table A-1: Variables used in the empirical analysis

Variable	Description and source
Country - manufacturing sector - time level	
$CREF_{cit}$	Composite reform indicator. It captures the exposure of manufacturing sector i in country c at time t to the policy reforms targeting services sectors in country c at time t. Variable defined in equation (1). *Source*: policy reform data from Transition Indicators Database, European Bank for Reconstruction and Development (EBRD). Input intensity data from US IO Table (mid 1990s) from OECD STAN IO Database
$cref_{cit}$	Normalised version of $CREF_{cit}$, varying between 0 and 1. It is computed as $cref_{cit} = (CREF_{cit} - \min\{CREF_{cit}\})/(\max\{CREF_{cit}\} - \min\{CREF_{cit}\})$
l_{cit}	Log of employment in manufacturing sector i in country c at time t. Version without log denoted with L. *Source*: UNIDO INDSTAT4, Rev. 3.
$\log$ output$_{cit}$	Log of output in manufacturing sector i in country c at time t. Output expressed in current USD. *Source*: UNIDO INDSTAT4, Rev. 3.
$\log$ wages$_{cit}$	Log of individual wages in manufacturing sector i in country c at time t. Wages expressed in current USD. *Source*: UNIDO INDSTAT4, Rev. 3.
$\log$ imports$_{cit}$	Log of gross imports of manufacturing sector i in country c at time t. Imports expressed in current USD (thousands). *Source*: World Bank WITS.
y_{cit}	Log of labor productivity (value added per worker) in manufacturing sector i in country c at time t. Value added expressed in current USD. *Source*: UNIDO INDSTAT4, Rev. 3.
$\log TFP_{cit}$	Log of total factor productivity in manufacturing sector i in country c at time t. $\log TFP_{cit}$ is defined in Section 5.3. *Source*: value added, total employment, investment from UNIDO INDSTAT4, Rev. 3. Prices from Penn World Table 8.1
Services sector - country - manufacturing sector level	
$w_{sci,mid2000s}$	Input intensity of services s into manufacturing sector i. It is equal to the corresponding technical coefficient from the input-output matrix of country c for the mid 2000s. Alternative measures (Leontief coefficients) are described in Appendix B. *Source*: OECD STAN IO Database.
Country - services sector - time level	
REF_{sct}	Policy reform indicator for services sector s in country c at time t. For detailed construction of the variable see Section 4. *Source*: Transition Indicator Database, EBRD.
Manufacturing sector - services sector level	
$w_{s,US,i,mid90s}$	Input intensity of services s into manufacturing sector i. In the benchmark estimation it is equal to the corresponding technical coefficient from the US input-output matrix for the mid 1990s. Alternative measures are described in Appendix B. *Source*: OECD STAN IO Database.
Country level	
$\bar{m}_c$	Variable used to divide the sample in Section 6.1. It is constructed as the average across time of m_{ct} which, case by case, captures the quality of one governance institution (either regulatory quality, rule of law or control of corruption) or human capital measured as the gross enrolment ratio in secondary education (average across both sexes). *Source*: Governance Institutions from the Worldwide Governance Indicator, World Bank. Human capital from World Development Indicators, World Bank

Table A-2: Countries and sectors in the empirical analysis

Countries		Sectors	
Albania	Latvia	15-16	31
Azerbaijan	Lithuania	17-19	32
Belarus	Mongolia	20	33
Bosnia and Herzegovina	Poland	21-22	34
Bulgaria	Republic of Moldova	23	35
Croatia	Romania	24	36-37
Czech Republic	Russian Federation	25	
Estonia	Slovakia	26	
Georgia	Slovenia	27	
Hungary	Republic of Macedonia	28	
Kazakhstan	Turkey	29	
Kyrgyzstan	Ukraine	30	

Notes: Sector numbers follow ISIC Rev. 3, 2 digits classification

B INPUT-OUTPUT COEFFICIENTS

TECHNICAL COEFFICIENTS

Technical coefficients are derived from the intermediate demand matrix M (the first quadrant of a social accounting matrix). M is a square matrix of dimension n where rows – indexed by r – are the supplying industries (domestic and international) and the columns – k – the using (domestic) industries. The number of industries in M is equal to n. A generic element m_{rk} of M represents the cost borne by sector k for the output produced by sector r (as domestic production plus imported foreign production) and used as intermediate input into k. Technical coefficients are the elements of the square matrix A, defined as:

$$A \equiv YM \tag{B-1}$$

where Y is an n-dimension square matrix where the main diagonal includes the inverse output of each industry and all the other elements are equal to zero. For each services-manufacturing sector pair (s, i), the technical coefficient is given by the element a_{si} of matrix A and it measures the cost of the intermediate inputs from services sector s for one dollar of total production of manufacturing sector i.

LEONTIEF COEFFICIENTS

The alternative measures of input intensity used in the paper are the coefficients derived from the Leontief inverse matrix. The input intensity of services sector s into manufacturing sector i that takes into account all the indirect linkages between the (upstream) supplying and the (downstream) using sector is given by the element l_{si} of matrix L, defined as:

$$L \equiv VB \tag{B-2}$$

where V is a dimension n square matrix of zeros, except along the main diagonal, that includes the value added-output ratios of each industry. B is the Leontief inverse $(I - A)^{-1}$, with A defined in equation (B-1) above.

C Description of the EBRD reform indicators and the independent variables

The index ranges from 1 (almost no progress in comparison with a socialist economy) to 4.3 (most advanced implementation of reform agenda) and has been document annually over the 1990 2012 period by the EBRD's chief economist office. Below, we provide a description of the underlying data and how we aggregate them to compute our independent variable.[27]

In order to combine the EBRD database with the OECD STAN data where industries are classified according ISIC rev. 3 (2 digits) we apply the following mapping from EBRD sectors to ISIC: finance to sectors 65, 66 and 67; telecommunications to sector 64; transports to sectors 60,61,62 and 63; utilities to 40 and 41.

We proceed to some aggregations of the different reforms indicators in order to map them to the ISIC rev. 3 classification. The aggregation and the different original indicators are detailed below:

1. *Finance*: Our indicators is the simple average of the banking and non-banking reform indicators.
    - Banking reform and interest rate liberalisation: 1 corresponds to minimum progress beyond establishment of a two-tier system; 4.3 corresponds to full convergence of banking laws and regulations with BIS standards.
    - Securities markets and non-bank financial institutions: 1 corresponds to minimum progress; 4.3 corresponds to full convergence of securities laws and regulations with IOSCO standards.
2. *Telecommunications*: Our indicator is equal to the original one provided by EBRD:
    - Telecommunications: 1 implies that there has been little progress in commercialisation and regulation (minimal private sector involvement, strong political interference in management decisions, low tariffs, with extensive cross-subsidisation etc.); 4.3 corresponds to an effective regulation through an independent entity.
3. *Transports*: Our indicator is the simple average of the railways and roads reform indicators.

[27] Description of the underlying data comes from the EBRD's website:
`http://www.ebrd.com/cs/Satellite?c=Content\&cid=1395237866249\&d=\&pagename=EBRD\%2FContent\%2FContentLayout`

- Railways: 1 corresponds to a situation where railways are managed by a monolithic government structure, with few commercial freedoms and no private sector involvement and extensive cross-subsidisation; 4.3 corresponds to railways fully being commercialised, with separate internal profit centres for freight and passenger services and involvement of private companies in the freight business and maintenance.
- Roads: 1 corresponds to minimal degree of decentralisation and no commercialisation. All regulatory, road management and resource allocation functions centralised at ministerial level; 4.3 corresponds to a fully decentralization with road maintenance competitively awarded to private companies.

4. *Utilities*: Our indicator is the simple average of the electricity and water reform indicators.

    - Electricity: 1 corresponds to the power sector operating as government department, with little competitive pressure; 4.3 corresponds to tariffs being driven by costs and providing adequate incentives for efficiency improvements.
    - Water: 1 corresponds to minimal degree of decentralisation and no commercialisation with no financial autonomy capacity at municipal level; 4.3 implies that water utilities fully decentralised and commercialised.