THE IMPORTANCE OF MESOECONOMIC RESEARCH – THE CASE OF THE BUSINESS CYCLE IN THE CZECH BUILDING INDUSTRY

Božena Kadeřábková – Petr Maleček

Abstract

The aim of this paper is to prove the relevance of research at the meso-level of economics, which comprises the research of individual markets, industries, sectors, regions etc. Mesoeconomics then help us to discover internal dynamic processes within macroeconomic development, variability within macroeconomic aggregates and in this way to facilitate predictability at the macro-level. This paper examines the case of the construction sector, which is specific from many points of view. The importance of mesoeconomic approach in the case of the construction sector generally exhibits many idiosyncrasies within the context of EU countries, and is only weakly correlated with the overall business cycle. Low correlation between construction and the total output out of the EU countries can be explained by the existence of a large number of factors, which affect construction to a much larger extent than other sectors. Concerning the time dimension of the development in construction, the panel regression model showed that the most fitting conclusion is the contemporaneous interdependence between gross value added in construction and the total gross value added.

Key words: mesoeconomics, business cycle, construction sector, panel analysis

JEL Code: E32, L74, C23

Introduction

The traditional division of economic theory between micro- and macroeconomics has been over time augmented with a specific level of aggregation, which is commonly referred to as mesoeconomics. It covers many different aspects, such as economic sectors, geographic regions or segments of population (according to age, gender or other specifics). This branch of economics then allows researchers to overcome deficiencies both in macroeconomic analysis (a possible too broad scope and data instruments) and in microeconomics, which may not be able to fully describe behaviour of certain population groups. The aim of this paper is then to present possibilities of mesoeconomics research by means of examining economic

processes in the case of the construction sector, with a particular focus on the situation in the Czech Republic. The analysis itself will then comprise of a comparison of the course of business cycles in selected sectors of EU Member States' economies, driving forces of the Czech construction sector, and also time aspects of construction with respect to the overall business cycle.

1 Literature review

The roots of mesoeconomic analysis lie in the 1930s, whereas it emerged together with the advent of Keynesian theories and input-output analysis. Seminal authors dealing with mesoeconomic topics are, *inter alia*, Holland (1987), Bain (1968), Foss (1996), Andersson (2003) and Tirole (1988).

According to Andersson (2003, p. 52), mesoeconomic research was spurred by the need of analysis between macro- and micro-levels, which then allows to conceive the economy as a sum of components at the meso-level. Preston (1984) argues that economists often resort to mesoeconomic approaches due to the dichotomy between micro- and macro findings and their presentation. Elsner (2010) acknowledges the emergence of new innovations and therefore higher macroeconomic output on the back of the creation of new meso-groups in socio-economic areas such as geographic regions, economic sectors, occupations, interest groups et al. Arguably, such process may also be related e. g. to the creation of new industrial zones.

Andersson (2004a, 2004b) utilized the mesoeconomic analysis in the case of the Danish and Swedish construction sector; similarly, Andersson and Clobes (2004) then described building industry in Germany. This technique then allowed for a better clarification and characterisation of this sector, moreover, it also explained the way towards reaching equilibrium between the "old" and "new" German *Länder*after the reunification of Germany.

Other authors which researched the sectoral aspects of an economy is notably Gordon (1996), who argues that a low output of an economy may stem from differences in individual sectors. Over time, some of them may then become more prominent and lead the whole economy to a higher growth path.

As already argued, mesoeconomics also frequently examines particular labour market aspects. Di Maro (2002) showed that long-term shifts in individual industrial sectors may affect aggregate employment. Sectoral approach to Phillips curve was discussed e. g. by Eagly (1965), Lester (1968) and Brown (1988).

2 Business cycle in the construction sector

In order to corroborate the usefulness of meso-level analysis, this chapter seeks to analyse in a greater detail idiosyncrasies of the construction sector in EU countries (with a particular focus on the Czech Republic),together with the analysis of driving forces in this sector. The empirical analysis in conducted on data at quarterly frequency (from Q1/1997 to Q4/2014, where available), all taken from the Eurostat database (national accounts and business surveys statistics).

2.1 Relationship of the construction sector in EU countries to the business cycle

In general terms, construction seems to be only weakly correlated with the overall business cycle in EU countries. This is demonstrated by Table 1 listing Pearson's correlation coefficients between the growth of real gross value added in selected sectors and the total real gross value added.In most EU countries, services show the highest degree of synchronization with the business cycle, which can be to a large extent explained by their highest weight in total value added; and construction is typically the least correlated sector. Remarkably, the Czech construction sector exhibits the second lowest correlation of construction output with the business cycle out of the EU countries.

Tab. 1: Pearson's correlation coefficients between y-o-y growth of gross value added in selected sectors and y-o-y growth of total gross value added in a given economy, in 2010 prices

	construction	industry	services		construction	industry	services
BE	0,59	0,88	0,91	LU	0,42	0,47	0,94
BG	0,18	0,59	0,76	HU	0,47	0,73	0,74
CZ	0,36	0,90	0,77	NL	0,65	0,66	0,95
DK	0,43	0,84	0,89	AT	0,51	0,90	0,87
DE	0,48	0,91	0,83	PL	0,48	0,69	0,68
EE	0,75	0,84	0,96	PT	0,91	0,75	0,95
IE	0,55	0,70	0,64	RO	0,75	0,66	0,65
EL	0,62	0,68	0,88	SI	0,70	0,88	0,93
ES	0,84	0,84	0,95	SK	0,42	0,64	0,65
FR	0,71	0,90	0,98	FI	0,58	0,95	0,87
HR	0,82	0,91	0,97	SE	0,64	0,94	0,88
IT	0,69	0,90	0,96	UK	0,70	0,83	0,96
CY	0,90	0,76	0,94	**EUaverage**	**0,62**	**0,79**	**0,87**
LV	0,82	0,65	0,94	**min. EU**	**0,18**	**0,47**	**0,64**
LT	0,89	0,84	0,98	**max. EU**	**0,91**	**0,95**	**0,98**

Source: Eurostat [accessed on 08-Apr-2015], Own calculations.

The next important question is the time aspect, i.e. whether construction leads or lags behind the total gross value added. To this point, we constructed a panel regression encompassing 26 EU countries,[1] specified by equations (1) and (2). The y-o-y growth of total real gross value added of an *i*-th country at a quarter *t* is regressed against the y-o-y growth of real gross value added in construction (CON) with a given lag *n*, economic sentiment indicator (ESI), duration of production in industry assured by current order-books (ORD) capacity utilization in industry (CAP).[2]The parameter α represents a common constant and $\gamma_i$country-specific fixed effects which were found highly statistically significant according to the likelihood ratio test. As indicated by Table 4, all regression variables are stationary.

$$GVA_{i,t} = \alpha + \gamma_i + CON'_{i,t-n}\beta_1 + ESI'_{i,t}\beta_2 + ORD'_{i,t}\beta_3 + CAP'_{i,t}\beta_4 + \varepsilon_{i,t} \quad (1)$$

$$\varepsilon_{i,t} = \rho_i \varepsilon_{i,t-1} + \eta_{i,t} \quad (2)$$

Table 2 shows the result of this model while using different lags or leads of the construction gross value added.[3]The second row contains t-statistics for the parameter β_1 in equation (1), and the remaining rows values for information criteria: Akaike, Schwarz and Hannan-Quinn. All indicators point to the contemporaneous development of gross value added in construction and the total gross value added: the $\beta_1$model parameter is the most statistically significant at no lags and also all information criteria indicate the highest relative information content. The results of the model with no lags are then presented in Table 3. We can see that all parameters are highly statistically significant and that there exists a positive contemporaneous co-movement between the growth of gross value added in construction and the total gross value added.

Tab. 2: Test results regarding the time aspect of construction in EU countries

lag	-2	-1	0	1	2
t-stat.	4.270	-0.360	13.315	4.745	4.926
AIC	3.739	3.744	3.636	3.739	3.753
SC	3.847	3.851	3.742	3.847	3.862
HQ	3.779	3.783	3.675	3.779	3.794

Source: Eurostat [accessed on 08-Apr-2015], Own calculations.

[1] All EU countries excluding Ireland and Malta, for which the necessary data were missing at the time of creating this study.

[2]We also allow for a first-order autoregressive process indicated by equation (2).

[3] Figures in the first row of Table 2 indicate time shift of gross value added in construction, as an example, "-1" represents the model setup with lagged gross value added in construction by one quarter, "1" leading by one quarter.

Tab. 3: Main characteristics of the model with no lags of the growth of value added in construction

	coeff.	std. error	t-stat.	prob.
const.	-24.543	1.496	-16.395	0.000
CON	0.068	0.005	13.315	0.000
ESI	0.154	0.010	14.530	0.000
ORD	0.016	0.004	3.354	0.000
CAP	0.139	0.017	8.046	0.000
AR(1)	0.642	0.019	32.372	0.000
Adj. R^2	0.842		D-W stat.	2.054

Source: Eurostat [accessed on 08-Apr-2015], Own calculations.

Tab. 4: Panel unit root tests[4]

variable	ADF test		PP test	
	test stat.	prob.	test stat.	prob.
GVA	196.083	0.000	141.979	0.000
CON	287.725	0.000	271.054	0.000
ESI	217.502	0.000	117.804	0.000
ORD	205.888	0.000	184.842	0.000
CAP	128.337	0.000	112.639	0.000

Source: Eurostat [accessed on 08-Apr-2015], Own calculations.

2.2 A deeper examination of driving forces of the construction sector within the context of the Czech Republic

Figure 1 shows the development of gross value added in selected sectors of the Czech economy. Overall, private services seem to closely mirror development of total gross value added, but there exist two distinct periods where courses of both indicators were divergent: in 2006/07 and 2013/14.On the other hand, gross value added in manufacturing is marked by much greater amplitude than the aggregate, which can be caused by prominent export orientation of Czech industry and thus greater exposure to external shocks. Output of the Czech construction sector then copied several shocks (most notably the 2008/09 crisis), but from the broad perspective, it follows the course of the total gross value added only weakly.

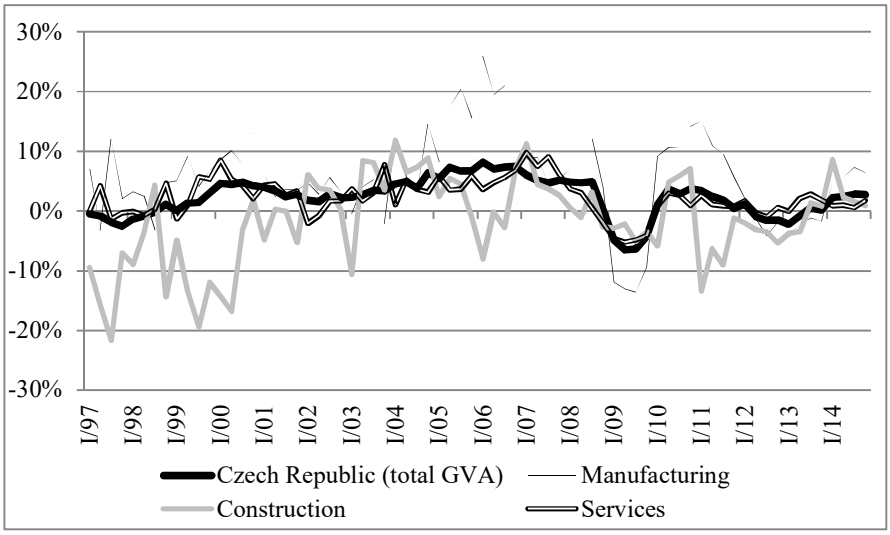
The principal reason for this development is that construction is dependent only on one GDP component: gross fixed capital formation. Figure 2 presents the relation between

[4] Null hypothesis assumes the existence of a unit root. Two variants of the panel unit root test were conducted: the augmented Dickey-Fuller test (ADF) and the Phillips-Perron test (PP). All tests assume individual autoregressive structures and intercepts; the number of lags was chosen according to the Schwarz information criterion.

two GDP aggregates for the Czech Republic according two methods: the y-o-y growth of real gross value added in construction (i.e. the production approach) and y-o-y growth of real gross fixed capital formation (sub-aggregate for total construction, i.e. the expenditure approach). There is then a clear empirical relationship between these two variables; the relatively high volatility of gross value added in construction is then likely caused by the existence of large one-off infrastructure projects.

The difference between construction and other sectors of an economy also stems from the fact that many factors affect construction disproportionally more than other sectors, such as 1) discretionary government expenditure on fixed investments (in the Czech Republic, this has been largely dependent on the state of relevant legal acts allowing for slower or more rapid launch of construction works); 2) interest rate development – for mortgages with an effect on households' building activity – or for loans to businesses; 3) capacity utilization in industry, expectations of future development on export markets etc.

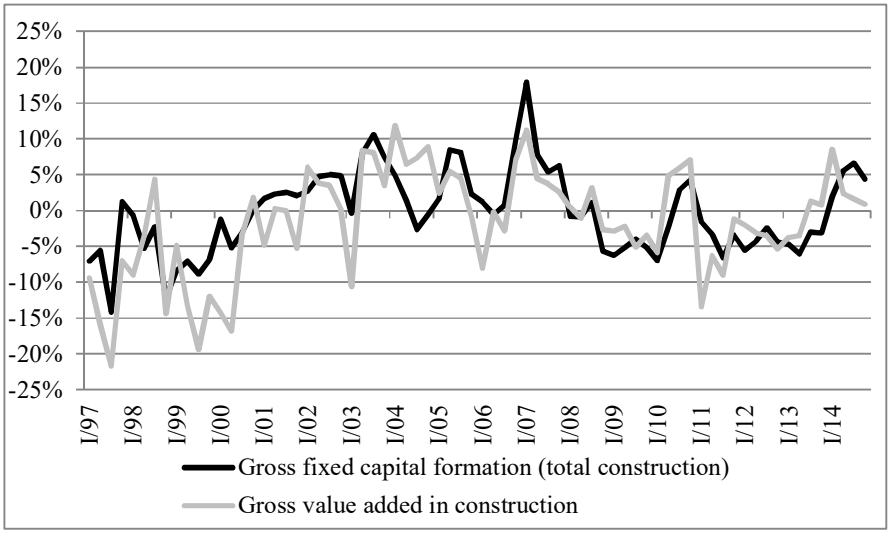
Fig. 1: Y-o-y growth of gross value added in selected sectors in the Czech Republic, in 2010 prices[5]



Source: Eurostat [accessed on 08-Apr-2015].

[5] „Services" are defined as total services excluding public administration and defence, education and healthcare (NACE O, P and Q)

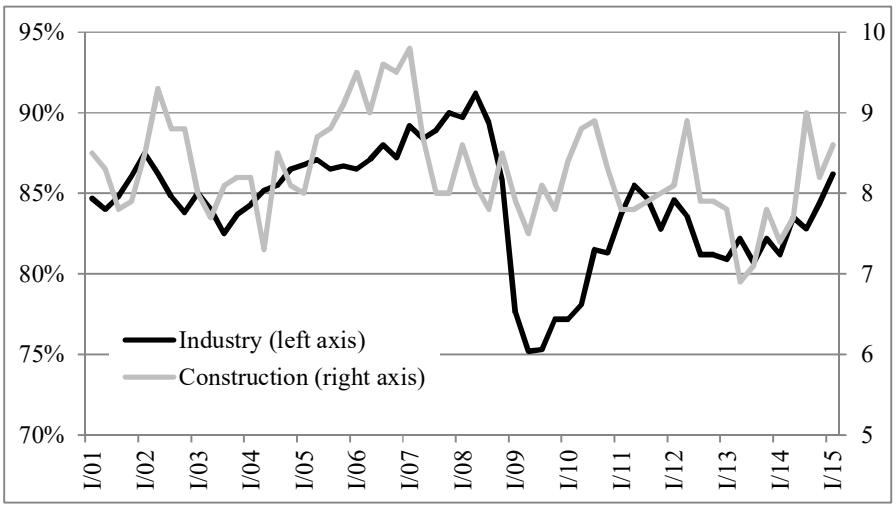
Fig. 2: A comparison of y-o-y growths of gross value added in construction and gross fixed capital formation (construction assets), in 2010 prices



Source: Eurostat [accessed on 08-Apr-2015].

Different courses of business cycle in construction and industry can be further explained by indicators which contain information quantifying spare capacities. In the case of industry, this indicator is surveyed directly by means of the degree of capacity utilization; in construction, a similar measure describes operating time in construction companies which is ensured by current backlog of orders. Figure 3 shows that in the Czech Republic, there was a remarkable slump in industrial capacity utilization largely due to the marked downswing of exports. The development of free capacities construction is again quite different and more volatile, which can be caused by (quite irregular) taking up of large orders which significantly affect working time ensured by current amount of contracts. A closer examination shows us that this indicator also does not correspond with the total overall business cycle in the Czech Republic, unlike the development in capacity utilization in industry.

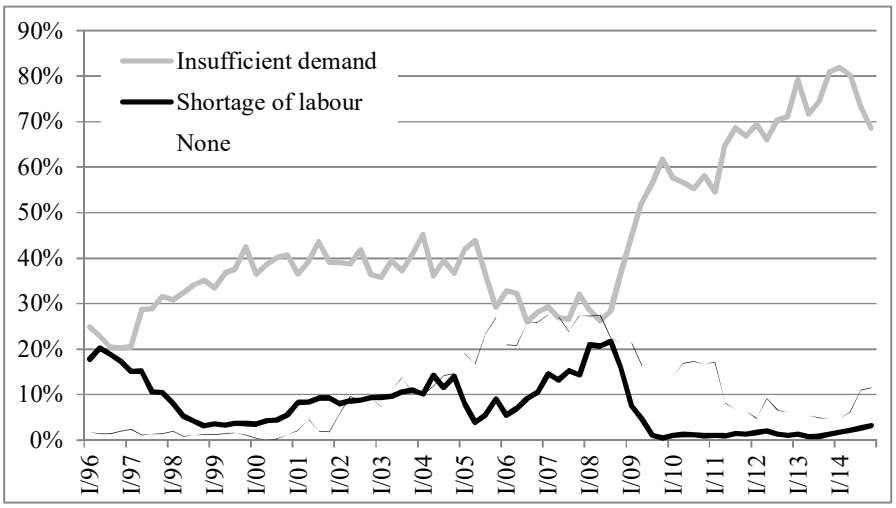
Fig. 3: Indicators of capacity utilization in the Czech Republic for industry and construction



Source: Eurostat [accessed on 08-Apr-2015].

The next way to analyse cyclical behaviour of a sector is to examine factors limiting production of this sector. These are typically surveyed in both industrial and construction companies. Figure 4 shows the time series of two most prominent factors limiting output of the construction sector in the Czech Republic: insufficient demand and shortage of skilled labour, together with the percentage of no declared obstacles. There seem to be two distinct periods: after 2009 with predominant lack of demand (66% of answers on average) and the period preceding the year 2009, where insufficient demand posed a significant drag on output, but with a much smaller prevalence (34% of cases on average). It is not surprising that there exists a significant negative correlation between the lack of demand and the lack of skilled workers; after 2009, construction companies therefore generally do not perceive limitations stemming from the availability of skilled employees.

Fig. 4: Selected factors limiting construction activity in the Czech Republic (100% in total)



Source: Eurostat [accessed on 08-Apr-2015].

Conclusion

The aim of this study was to demonstrate the importance of mesoeconomic approach in the case of the construction sector. Generally, it exhibits many idiosyncrasies within the context of EU countries, and is only weakly correlated with the overall business cycle.

The Czech Republic is no exception in this respect, whereas its construction sector shows the second lowest correlation between construction and the total output out of the EU countries. The particularly low correlation can be explained by the existence of a large number of factors, which affect construction to a much larger extent than other sectors. The difference between construction and industry in particular also goes back to the quite different courses of indicators capturing spare capacities. Whereas this variable for industry is linked particularly well to the overall business cycle in the Czech Republic, the opposite holds in the case of the construction sector.

Furthermore, concerning the time dimension of the development in construction, the panel regression model showed that the most fitting conclusion is the contemporaneous interdependence between gross value added in construction and the total gross value added.

References

Andersson, N. (2003). *A Mesoeconomic Analysis of the Construction Sector*. Lund: Lund Institute of Technology.

Andersson, N. (2004a). The Danish construction sector at the end of the 1990s. In *Construction Sector System Approach: An International Framework*. Rotterdam: CIB Rotterdam.

Andersson, N. (2004b). The Swedish construction sector : Its economic and social role. In *Construction Sector System Approach: An International Framework*. Rotterdam: CIB Rotterdam.

Andersson, N., &Clobes, J. (2004). The German construction sector a decade after reunification. In *Construction Sector System Approach: An International Framework*. Rotterdam: CIB Rotterdam.

Bain, J. (1968). *Industrial organization* (2d ed.). New York: Wiley.

Brown, W. S. (1988). Institutional Structure and Deindustrialization. *Journal of Economic Issues, 22*(2), 589-597.

Eagly, R. V. (1965). Market Power as an Intervening Mechanism in Phillips Curve Analysis. *Economica, 32*(125), 48-64.

Elsner, W. (2010). The process and a simple logic of 'meso'. Emergence and the co-evolution of institutions and group size. *Journal of Evolutionary Economics, 20*(3), 445-477.

Foss, N. (1996). Research In Strategy, Economics, and Michael Porter. *Journal of Management Studies, 33*(1), 1-24.

Gordon, R. J. (1996). Problems in the Measurement and Performance of Service-Sector Productivity in the United States.*NBER Working Papers, 5519*.

Holland, S. (1987). *The market economy: From micro to mesoeconomics*. New York: St. Martin's Press.

Lester, R. A. (1968). Negotiated Wage Increases, 1951-1967. *The Review of Economics and Statistics, 50*(2), 173-181.

Di Maro, V. (2002). The Estimation Of The Nairu And The Effect Of Permanent Sectoral Employment Reallocation. The Italian Evidence. *University of Naples: Department of Economic Studies Working Papers, 7_2002*.

Preston, L. E. (1984). *A perspective on meso-economics (Discussion papers)*. Internationales Institut fur Management und Verwaltung.

Tirole, J. (1988). *The Theory of Industrial Organization* (10th ed.). London: The MIT Press.

Contact

doc. Ing. Božena Kadeřábková, CSc.
University of Economics, Prague, Faculty of Economics
nám. W. Churchilla 4, 130 67 Praha 3
kaderabb@vse.cz

Ing. Petr Maleček, Ph.D.
Ministry of Finance of the Czech Republic
Letenská 15, 118 10 Praha 1
Petr.Malecek@mfcr.cz