The Impact of Foreign Direct Investment on Employment in Romania: A Panel Data Investigation

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This dissertation aims to establish the existence, size and significance of the impact of foreign direct investment (FDI) on employment across sectors in Romania. The question stems from approaching FDI through a microeconomic perspective and hypothesizing on what its impacts would look like at a higher level. As highlighted in the literature features of new foreign investments, such as entry mode or investor motivation may create and destroy jobs in the host economy. These effects may aggregate themselves at a sector level since each sector has its specific points of attraction to investors. Hence the key hypothesis tested is whether FDI unilaterally increases employment across all sectors or whether its benefits are unevenly distributed and sector-specific. The hypothesis is verified through panel data fixed effects and random effects regressions. The estimated coefficients on FDI stocks are indeed positive yet of rather different magnitudes across sectors. The results are discussed at length in relation to Romania's position as a transition economy in the hope of bringing another perspective on the Romanian government's one-size-fits-all approach to foreign investment attraction.

1. Introduction

This dissertation aims to determine whether the demand for labour of foreign-owned firms influences national labour demand. I apply complementary theoretical approaches to incoming foreign direct investment (FDI) in Romania. The main assumption on which my argument rests is based on a marriage of different findings. That is, if the economic aims (Estrin and Meyer, 2007), powers (Krugman *et al*, 2015; Kindleberger, 1968) and criteria for investment appraisal (Dunning, 1971) of foreign firms are different than those of local firms, then their employment pattern will interfere with that of indigenous firms. The microeconomic literature reveals that different aspects of the new firm determine the number of new jobs created. I hypothesise that not only FDI impacts employment, but that it impacts it differently across sectors. The labour demand of international firms could skew or lead that of local firms in certain sectors, have no effect in others, and an even less visible effect when sectors are examined altogether.The task is to determine the size and sign of FDI effect on employment across sectors and speculate over its components.

This dissertation consists of six chapters. The literature chapter maps the features of incoming investment which would reflect in sectoral employment. To build my hypothesis, I define and discuss immediate direct effects, such as job creation when a new plant is opened, and *indirect* effects, such as productivity changes in local competitors. The particular features I chose can be contested, as well as the 'patchy' methodology. I did not entirely separate theory from empirics because FDI is still controversial, so taking definitions out of context would have been inadequate. Secondly, the methodological chapter describes variable construction and statistical method, providing a supportive backgroung for the panel regression. I chose panel data in the hope that changes in sectoral employment capture as much as possible of the investor's motivation and other microeconomic features of FDI. The third chapter shows the distribution of FDI and patterns of employment and FDI in selected sectors. I discuss whether I observed any common patterns across sectors. In light of what the literature review suggested, I argue that if sectors seem to react differently to FDI, then perhaps there is no typical FDI across all of them. Various direct and indirect effects are present in each.The results chapter seeks to answer the question in as much detail as possible. FDI indeed has a positive and significant effect across all sectors. I also investigate sectoral hetereogeneity further. Finally, I take a step back to examine the utility of capturing many dynamics in one FDI variable, and provide final challenges to my method and forward-looking suggestions.

My analysis is valuable because, in words of Lipsey and Sjöholm (2005), academics disagree about the effects of foreign investment but "policymakers seem to have made up their minds already" (p. 23). The phenomenon is especially important for the host country studied. Apart from the substantial amount of public debate on FDI in Romania, which revolves around anything from national sovereignty to the taste of tomatoes (Euronews, 2017), the implications of increasing FDI flows are important. If the Romanian government maintains its current encouraging attitude towards it, and the data indicates that it reduces the level of employment, then FDI could aggravate current labour market issues such as brain drain, subsistence agriculture and high youth unemployment, education or training (Duma *et al*, 2005). If there is no tangible effect then foreign investment might nonetheless create an interdependence between the local labour market and foreign investors. If the effects are positive, and indeed the results show that more FDI is highly likely to increase employment regardless of the sector, there are multiple explanations and implications that I explore in the results chapter.

2. Literature Review

Individual investment creates new jobs, whereas FDI stocks can impact the level of employment in the host economy negatively or positively (Estrin and Meyer, 2004). The literature suggests a range of channels through which employment could be fostered or reduced. Employment could grow through externalities, if preserved through mergers or simply when new production facilities are set up and a new distribution channel is required (Kaltenbrunner, 2007). To further complicate matters, foreign investment theories are more numerous than the generalizable empirical findings. Through this chapter I decide which features of new investment, and implicitly effects, are relevant for sectoral changes in employment.

2.1. Definitions

Kindleberger (1968) states that FDI increases income and employment, building the host economy's capacity to grow. He thus defines FDI as the *formation* of capital *abroad*. We can illustrate this by citing its potential to improve the factors used in the production process (Fillat and Woerz, 2011). Kindleberger's definition brings out the deep positive effects of incoming firms on locals. Dunning's (2001) OLI paradigm highlights the idea that determinants of FDI are not a rigid list but depend on the investor's goal and situation. Hence investors fight for strategic resources, alongside local firms. Therefore employment could suffer from FDI. In support of this, the internationalization determinant can be interpreted as investors trying to avoid market-determined prices (Grimwade, 2000). If foreigners avoid market prices in their home economy, they will surely act differently from host firms which use the local market prices (unless they invest abroad too).

Non-commercial channels through which FDI affects labour demand are employee training (Blomström and Kokko, 2002) and indirectly supporting active labour market policies by increasing government revenues (Slaughter, 2002).Most empirical studies find that FDI leads to job creation, nonetheless many specify the conditions under which this is possible (Estrin and Uvalic, 2016). In the rest of the chapter I attempt to classify and discuss them.

2.2. Direct Effects

In the following sections I discuss direct and indirect effects of FDI on sectoral employment. By *direct effects* I understand immediately apparent creation and destruction of jobs, due to aspects of the investing firm. These are: investor motivation, role of the newly-created affiliate in the multinational and entry mode. *Indirect effects* (*spillovers* and *externalities*) happen through an intermediary, such

as workers or local firms, and are visible in the longer term by affecting other variables such as productivity. An example is the transfer of management knowledge to local companies. The complexity arises when we consider that a market-seeking investor induces both direct and indirect effects. The effect of new entrants on the market structure is a cross-over between a direct and an indirect effect. I inspired the structure of the chapter from the approach of Bailey and Driffield (2007) who divide effects into short and long-term.

2.2.1. Investor Motivation

The motivation of the firm differentiates investments and their effects. Theories of firm motivation present broadly similar categories. I explore the direct effects arising from motivation, and the complementary indirect effects. If competitiveness, for instance, is affected through both direct and indirect effects, then so must be the level of jobs. In the next sub-sections I also discuss how the effect arising from motivation interacts with other features of the firm, such as ownership.

Narula and Dunning (2000) oppose efficiency-seeking and market-seeking foreign investors. Meyer and Estrin (2004) further classify efficiency-seeking FDI into labour versus resource-seeking. Similarly, they define market-seeking as investors who seek to establish a strong presence in the host economy's market. Fillat and Woerz's (2011) empirical study derives some effects. A labour-seeking firm employs many people, but also it exports more, thus, according to these authors, it communicates less with local firms. The transfer of technology or leadership to locals is negligible in this case.

On the other hand, a firm that seeks to grab a share of the market works closely with downstream and upstream firms (Narula and Dunning, 2000). The improvement of these firms favours the interest of the foreigner. A better performance of the connected firms represents an additional indirect effect which may result in employment in the long term, and in restructurations in the short term. Another negative effect is when the foreign investor's success pushes competing firms into liquidation. For instance, in an early study in Eastern Europe, Estrin *et al* (1997) found that market-motivated investors aiming to compete through product differentiation and higher quality perceived local firms as low-quality suppliers and preferred to import. The market-seeking firm reduced the ability of local firms to improve their performance, and perhaps decreased employment in the sector in question. On the other hand, they found that cost minimizing firms led to few indirect positive effects, thus confirming Fillat and Woerz's (2011) results for the cost-seeking case.

Grimwade (2000) also defines conglomerate FDI, where an existing foreign investor owns an interest in unrelated companies. Conglomerate FDI represents a challenge to my direct and indirect effects discussion, since the investor can acquire a controlling interest in any type of investment across any sector.

In the case of Romania, we can use the insights from Estrin and Meyer (2007) who found that most companies they studied in transition economies were not export-oriented, but attracted by potential market shares. Some of this is due to sector-specific constraints: food and telecommunication require relocation near customer base due to high transportation cost (ibid).

2.2.2. Role within the Multinational

These classifications of motivation resemble Krugman's (2015). His innovation consists in that he links the impact on the host economy to the place of the foreign affiliate within the multinational corporation. Vertical FDI is analogous to cost-seeking FDI (or resource-seeking), horizontal to market-seeking. The rationale is that if the affiliate is assigned a set part of the production chain, the investment is motivated by low cost. If the affiliate produces 'horizontally', that is by locating the entire production near its potential customer base, the number of jobs created might be the same but suppliers, subcontractors and intermediate service providers benefit.

Concerning the lack of positive indirect effects of cost-seeking FDI, Gaston and Nelson (2002) warn against the negative view of corporations operating vertically. Indeed, when analyzing vertical investment, Javorcik and Spatareanu (2011) found a stable positive link between improved productivity of Romanian suppliers and American FDI. They attribute this to the ability of European firms to benefit from cheap delivery of intermediary products from Europe. Thus investors from outside the EU should result in more long-term benefit for Romanian firms.

2.2.3. Entry Mode

The entry mode has a much more straightforward effect on new jobs. Acquisitions usually reduce jobs available in the acquired firm (Blömstrom and Kokko, 2004). If the acquisition is efficiency-seeking restructuration is likely, especially since Romanian firms are viewed as less-performing than firms from other European economies (McIntyre and Martin, 2013). On a positive note, Abor and Harvey (2008) observe that jobs in less competitive firms that could have been lost are preserved through mergers and acquisitions.

This is not the only type of investment that creates few jobs. In brownfield investments, the foreign partner cherry-picked the best employees thus reducing the success of the local partner (Estrin *et al*, 1997). On the other hand, low-performing local firms are associated with greenfield investment, which creates the most jobs (Estrin and Meyer, 2004) due to its large scale.

2.3. Interaction Effect: Market Structure

The existing market structure qualifies the employment outcome. Through a limited number of case studies, Estrin *et al* (1997) find that 6 out of 10 firms introduced their businesses into oligopolistic markets. Thus depending on the level of competition in the chosen sector, FDI exhibits a lasting effect on employment by modifying competition. The empirical investigation of Barrios, Görg and Strobl (2005) sheds some light on the timing of this effect. Initial peaks of FDI drive out local firms through increased competition, whereas, later on, FDI benefits the performance of local firms, perhaps leaving their employment unchanged. We can easily imagine that market-seeking investors exacerbate monopolistic tendencies in their targeted sector.

2.4. Indirect Effects

Discussing FDI without exploring indirect effects amounts precisely to negating what is interesting about this type of investment: that it represents a transfer of capital and control, but also of management and technology (Grimwade, 2000). Can FDI not only increase employment but also modify the labour market of the host economy?

The positive impacts (*spillovers* and *externalities*) of FDI are numerous (Liebscher *et al,* 2007). Liebscher *et al* argue that FDI can benefit all the agents involved in the production process: workers, suppliers, contractors, producers. Through externalities it may improve the competitiveness and efficiency of the industry, perhaps increasing employment in the long term. Campos and Kinoshita (2002) acknowledge them as a key channel through which FDI enhances human capital.

Spillovers can be classified according to their recipient. Horizontal spillovers are benefits to firms producing the same product (Campos and Kinoshita, 2002). Vertical spillovers are experienced by suppliers and consumers (ibid.). An example of the latter is when a multinational requires suppliers to improve the reliability of their services (Ciéslik and Hagemejer, 2014). Unfortunately spillovers predominantly reach the larger and more competitive indigenous firms (Liebscher *et al*, 2007).

Improving technology can intensify competition, increase the quality of human capital or improve the productivity of firms doing business with each other. These factors affect employment in each sector. Souare and Zhou (2016) posit that one way of increasing demand for labour is through an increase in demand for highly-skilled individuals. But sectoral employment will remain static if multinationals invest predominantly in high-skill sectors or acquire firms with a sizable density of highly-skilled workers (ibid.). Gersbach and Schmutzler (2011) note that foreign investors will not open cutting-edge R&D centres in the host economy unless it meets a number of criteria, not met by Romania. Hence there is a limit to what increase in jobs we can input to indirect technology transfers, especially if the economy in question is both transitioning and open to international competition.

Direct and indirect effects always add up to produce a different effect. Features of the host sector, such as the level of closeness between firms (Fillat and Woerz, 2011), affect the scope of technology transfers. Moreover, Javorcik (2008) records indirect positive spillovers *between sectors* when there is domestic participation in the investment, whereas total foreign ownership positively influences other firms in the *same sector* in the long-term.

2.5. Conclusion

No theory or empirical study provides a prediction of the effects of FDI on sectoral employment. Firstly because different features have conflicting effects. One efficiency-seeking investment may create jobs temporarily but destroy them through restructuring or reduce the jobs in other firms through higher competitiveness. Market-seeking investors may drive out local firms but they generate positive technology or management spillovers.

Secondly, the stocks of FDI evolve simultaneously with the changing conditions that they induce. In the long term, a substantial increase in FDI may generate a reduction in employment as it would increase domestic wages. Local companies would need to adapt their production so as to use less labour (De Vita, 2001). No matter how much more than locals multinational train their employees (Görg and Strobl, 2005), if many local companies are driven out the sectoral level of employment will stagnate or decrease.

I did not mention the effects on employment arising from the interactions between foreign investors, so it would be interesting to investigate them.

3. Methodology

In this chapter I briefly justify my methodology, then explain how I built my variables and my statistical method. I also offer suggestions for improvement.

I chose a one-country study because FDI leads to growth through different sectors in different countries (Bijsterboch and Kolasa, 2009). Moreover, had I used sectors from other European transitioning economies, I would have made my findings generalizable but I would have had trouble accounting for heterogeneity within the same sector – arising from features such as government support (Balwin and Wyplosz, 2012).

The novelty stems from the fact that few studies of foreign investment in transitioning economies highlight the heterogeneity between industries (Li *et al*, 2001) and acknowledge the correspondingly different impacts of FDI. Additionally, some papers present a firm-level or regional analysis, but, to my knowledge, few use sectoral data (Bang Vu *et al*, 2008), and none from Romania.

3.1 Building the Variables: Data Collection and Manipulation
To bring the variables covered in the sudopanel to the same level of aggregation, I performed calculations on all the time series. In what follows I describe how I constructed the employment variable, and discuss at length sources of inaccuracy.

The four variables are: *sectoral FDI stock*, the *number of employees per sector at the end of the year*, *GDP per sector* and *sectoral average monthly wage before taxation and employer contributions*. There are alternative measures of foreign investor presence such as employment or sales minus purchased intermediate goods (Krugman *et al*, 2015).

To attribute the effects of FDI to each sector, I attempted to match the production process with the workers that were actually involved in it. I first added separate employment time series which are highly disaggregated. Some match precisely, others less so. I used the average (not effective) number of employees on few occasions, but these measures are quite similar. I describe my method for matching FDI and employment in one sector, and let the reader imagine this process for the rest of the sectors. For an indication of all the calculations I performed (see Appendix A).

I matched the *telecommunication and post* FDI stock with the private postal employees by approximating the first three years, where values were missing, according to the trend observed in the available values. To these I added communication employees, which includes IT workers. I excluded public postal services because I assumed that employment in this part of the public sector would remain relatively constant and unaffected by FDI. This was confirmed by calculating yearly change in the number of workers, which proved small: 0.26% average rate of change per year in the early years. However, towards the end of the time series, the decline is bigger. Perhaps private courier services compete against public services but the decline of the public sector's market share is only visible in the longer term. Hence my method should be valid because the panel is relatively short.

3.2. The Econometric Model

In the fixed effects (FE) model, the sectoral effects are correlated with included variables, so the correlation between α_i and FDI stock is other than zero. The FE model assumes that the difference between individual observations at the cross-section level are encapsulated in the term α_i. In this model, the effect of FDI is constant across all sectors. This model implies that industries indeed have different employment levels, but that FDI does not influence sectoral employment deeply. One interpretation of the assumptions within this model is that either indirect effects are not substantial, or that different direct and indirect effects sum up in an efficient way in each sector so as to result in an even change in employment across them. Seen the observations in the literature and the next descriptive data chapter, I am somewhat skeptical of this model. Different sectors would require different impacts, coming from quantitatively and qualitatively different types of FDI in order to achieve the same change in employment.

The fixed effects model is:

$$\text{Employment}_{it} = \alpha_i + \text{FDI stock}_{it} + \text{Average Wage}_{it} + \text{Sectoral GDP}_{it} + \varepsilon_{it} \text{ (1)}$$

For the random effects (RE) model, sectoral effects are not correlated with the independent variables. Therefore, the covariance between the error term and FDI stock -the explanatory variable of interest- is zero. The RE model is more sophisticated as it computes a compound disturbance term, and considers both time-invariant differences between sectors and cross-section heterogeneity. The random effects equation is:

$$\text{Employment}_{it} = \text{FDI stock}_{it} + \text{Average Wage}_{it} + \text{Sectoral GDP}_{it} + \varepsilon_{it} + u_i \text{ (2)}$$

where *i* denotes the sector i=1; 2; …,21 (See Appendix B for sector coding)
and *t* is the year, where t= 2004, …, 2015.

The panel is strongly balanced, nonetheless I was unable to find GDP data for 2015 and part of the wages in agriculture.

3.3. Limitations and Forward-looking Comments

Unfortunately the limitations to this dissertation's methodology are equal to, if not more than, the insights it offers. Firstly, to create a sudopanel I calculated data manually so some values are rough estimated.

Double-counting Employees
Secondly, an overlap in number of workers is to be expected since the sectoral divisions do not match exactly. One reason is that the level of aggregation used for the FDI series is adapted to the stocks received. The National Institue of Statistics (NIS) has used the CAEN2 methodology throughout the entire period covered by the employment statistics, whereas an adapted version of CAEN1 has been used until 2007 inclusive to record FDI stocks. Other minor disparities arise when switching from Balance of Payments Manual 5 to the BPM6 methodology in 2013.

Double-counting Employees in the Services
Aggregation is low in manufacture but very high in services, thus producing inexactitude. For instance, there is no correspondent employment measure to '*Professional, scientific, technical and administrative services'*, not even if this category is divided into four separate activities. The service category includes industries where FDI is unusual, such as photography and scientific research. Highly-skilled services are recorded concomitantly with '*support*' activities, such as personal assistance with landscape painting. These activities do not have much in common apart from being services, so the insights from the literature cannot be used. I expect some unaccounted for disturbance from this category, especially since FDI stocks here are important.

Country-specific Issues
I am not accounting for dynamics specific to transition economies: corruption (EBRD, 2004) or policies aimed at catching-up and integration (Lechman, 2014). EU enlargement alters both location and

internalization advantages (Meyer, 2007) and, during transition, determinants of FDI inflows are difficult to separate from policy reforms (Jensen, 2007). These could be obscuring the impact of FDI, however if they affect sectors equally they should be comprised in the panel specification.

Further Research

My research can be developed by eliciting whether foreign-owned firms improve the *quality* of human capital, assuming it would take indigenous firms longer to improve it in absence of FDI's superior training and management. Employment data by qualification would help see if FDI affects categories of workers differently.

In the following chapter I closely examine FDI and employment. I describe the distribution of FDI and discuss patterns when plotting one against the other.

4. Descriptive Data and Preliminary Sectoral Analysis

4.1. Distribution of FDI

Which effects are plausible in different sectors in Romania? Features of the host economy should make it attractive to one type of FDI rather than another (Melitz, 2005). Lower cost of labour will attract vertical FDI and repeal market-seeking FDI. Combined with high skills, it represents an advantage in transition economies (ibid.). As investors allocate labour-intensive activities to places with cheap labour (Masso *et al*, 2008), Romania should attract efficiency-seeking FDI in low cost, high-skill sectors. But low-wage countries are also very attractive for less skilled industries (Blönigen and Wang, 2005). And Romania is a good candidate for market-seeking FDI due to its large market. What do the actual FDI stocks tell us?

Figure 1. Yearly FDI Stock per Sector in Romania
(millions EUR)
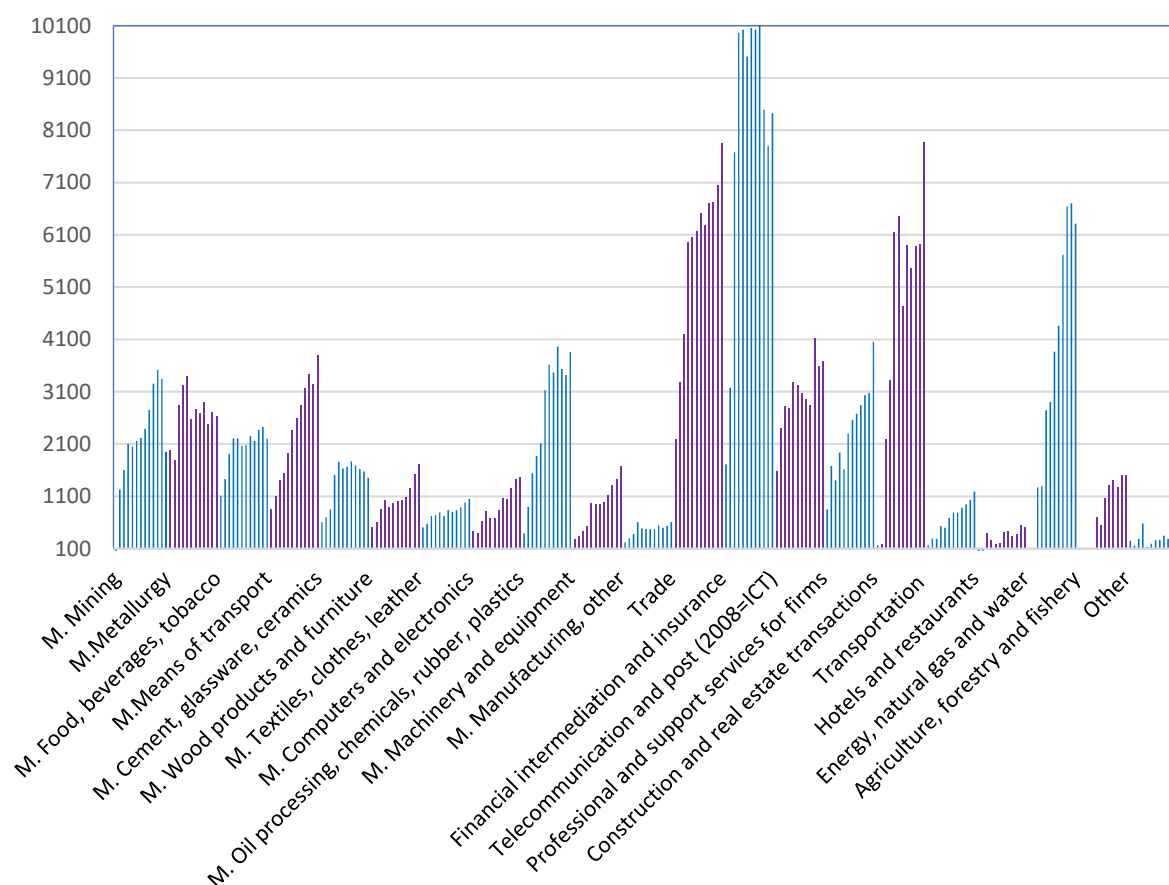
Source: FDI Investment Reports 2004-2016.

Figure 1 shows that this does not seem to be the case. We cannot conclude whether more FDI reaches low or high skill sectors, but FDI in services is not negligible. Two out of four service sectors record double the average FDI in manufacture. These are trade (low skill) and the financial services (high skill).

That might be because service categories are much less numerous than manufacture ones. Nonetheless, sectors with both a service and manufacture component (Cave, 2012) such as the *telecommunications* and *construction and real estate* also record top levels of FDI. This represents an issue because most empirical studies I reviewed focused on the manufacturing industries.
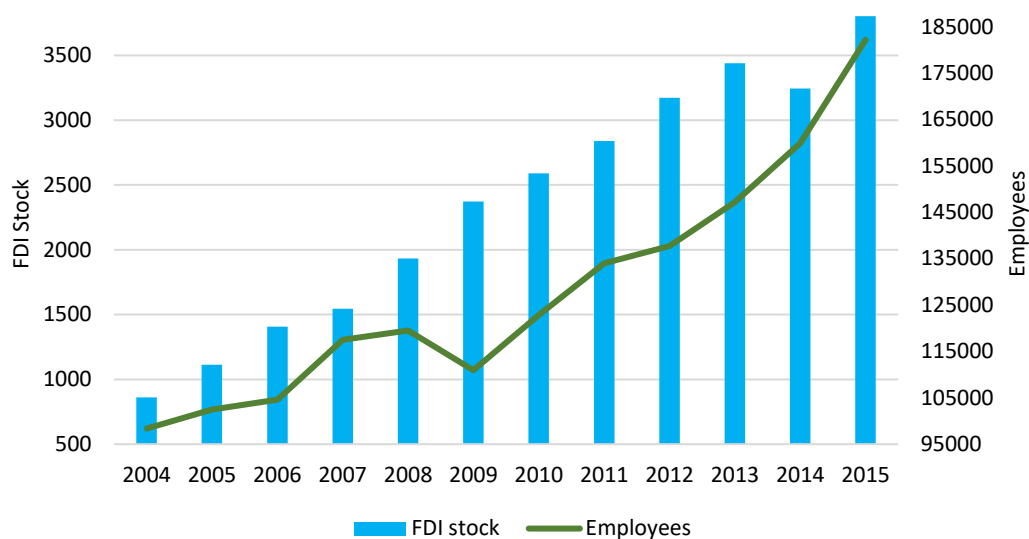
4.2. Diversity across Sectors

We can see from Table A that the standard deviation across sectors is larger than that over time for all variables. Hence it is worth investigating unobserved time-invariant and especially time-variant factors across sectors.

Table A. Variable Summary Statistic

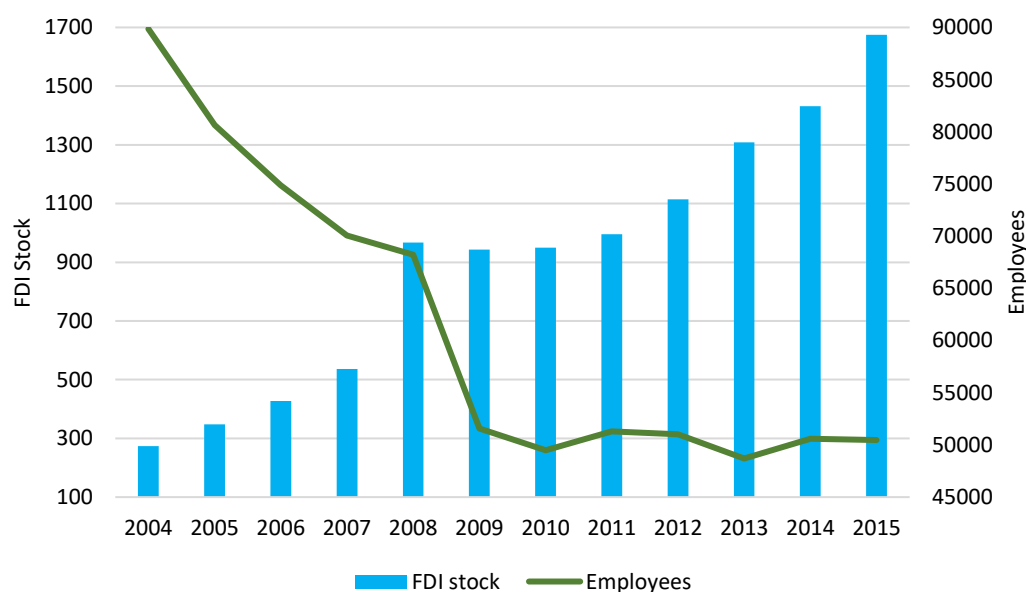| Variable (unit)	Mean	Standard deviation **overall** *between (across sectors)* within (over time)
FDI stock$_{it}$ (EURO million)	2289.3	**2 239.7**
		1 991.6
		1 086.5
Employment$_{it}$	177 065.3	**196 129.8**
		191 660.3
		53 353.9
Average Wage$_{it}$ (RON)	2 011.7	**1 057.7**
		804.4
		702.9
Sectoral GDP$_{it}$ (RON million)	21 352.3	**18 780.5**
		15 869
		10 575.1

When plotting FDI and employment in all sectors, I observed that most sectors exhibit a 'mixed' and negative correlation, as seen in figures 2 and 3 which are shown below for illustration.

Figure 2. FDI and Employment in Manufacture of Means of Transport

Figure 3. FDI and Employment in Machinery Manufacturing Industry

This is an early confirmation of the regression output: if sectors look as if they differ in their 'relationship' to FDI, the size of the coefficient on FDI will be moderate.

The literature on FDI could only explain dynamics in *some* sectors, such as textiles. Yet the graphs plotted here do not represent diagnostics or complete explanations, but an attempt to test the insights from empirical studies.

For instance, in the wood and textile sectors, employment repeatedly peaks before FDI reaches a short-run maximum, and at an increasingly lower level than the previous one. In both sectors wages are much lower than in others, attracting cost-efficiency investment. Romania is a remarkable exporter of textiles in Europe, and of labour-intensive, low-skill goods (Crespo and Fontoura, 2007; Hudson *et al* 2005). Since both are labour-intensive (Driffield and Love, 2005) and exhibit no barriers to business-making (Hanzl-Weiß, 2004), firms easily enter and exit.

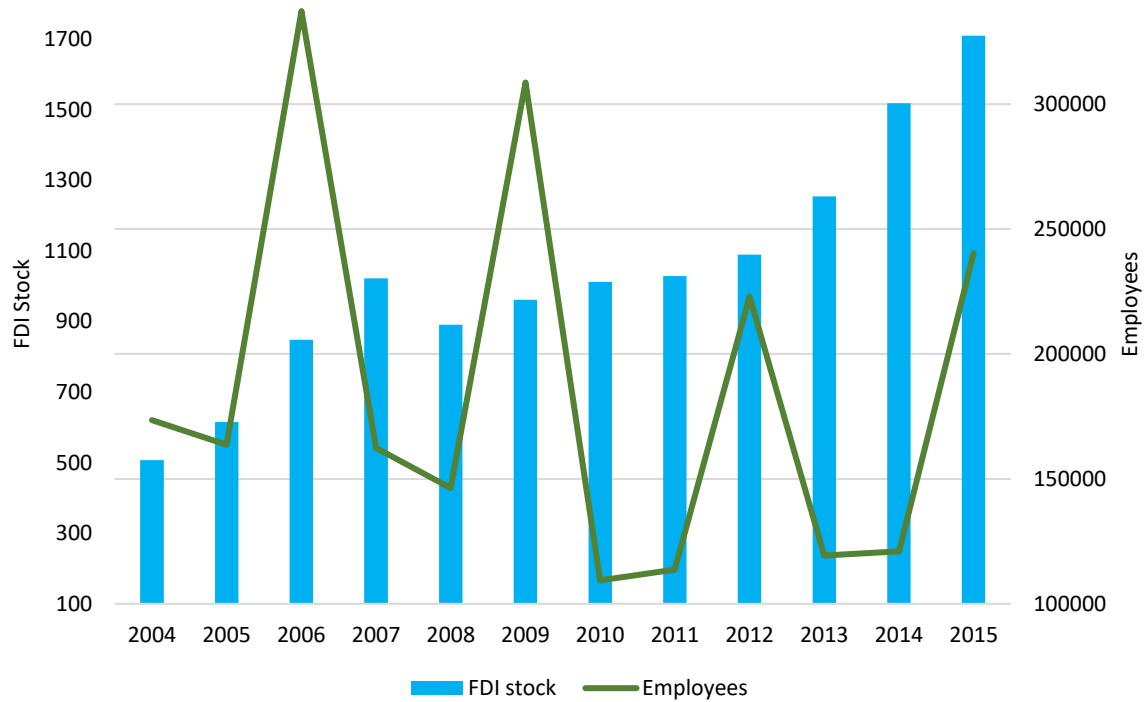**Figure 4. FDI and Employment in Textiles**
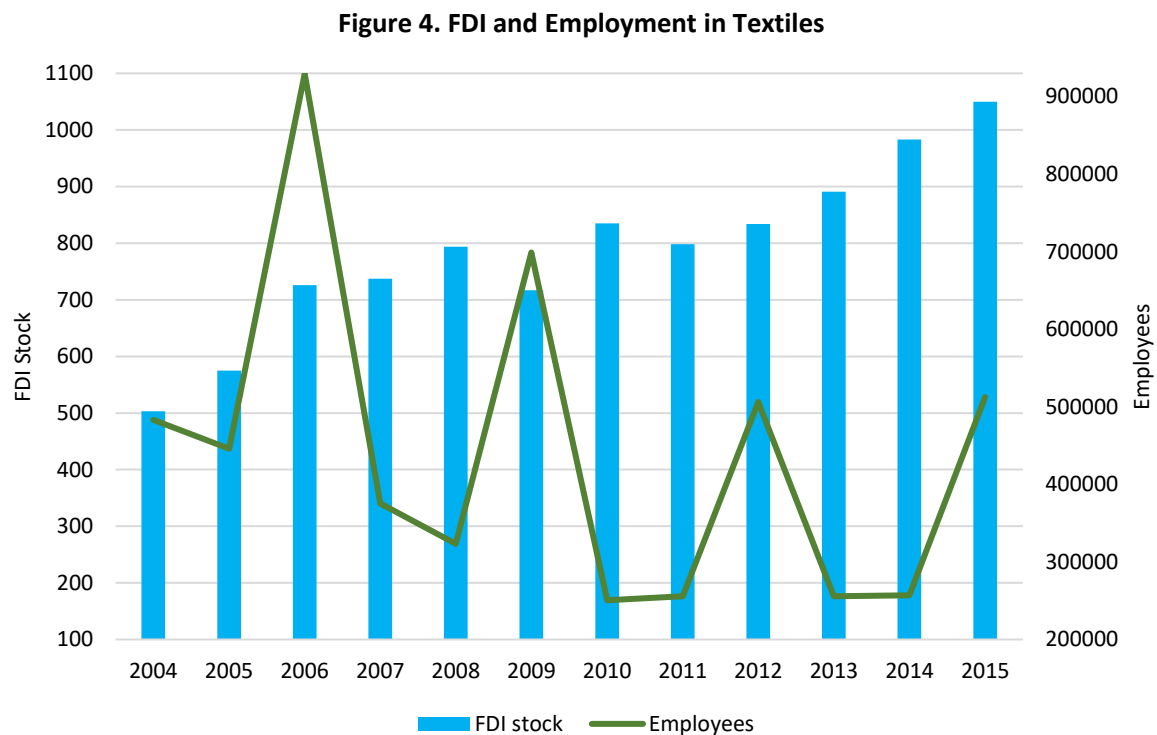
Source: FDI Investment reports 2004-2016, € MILLIONS; FOM104G, FOM105H, FOM108G.

The cost incentive, easy exit and reliance on export explain the strong movements in both employment and FDI. Perhaps local firms also cannot guard their market share against foreigners.
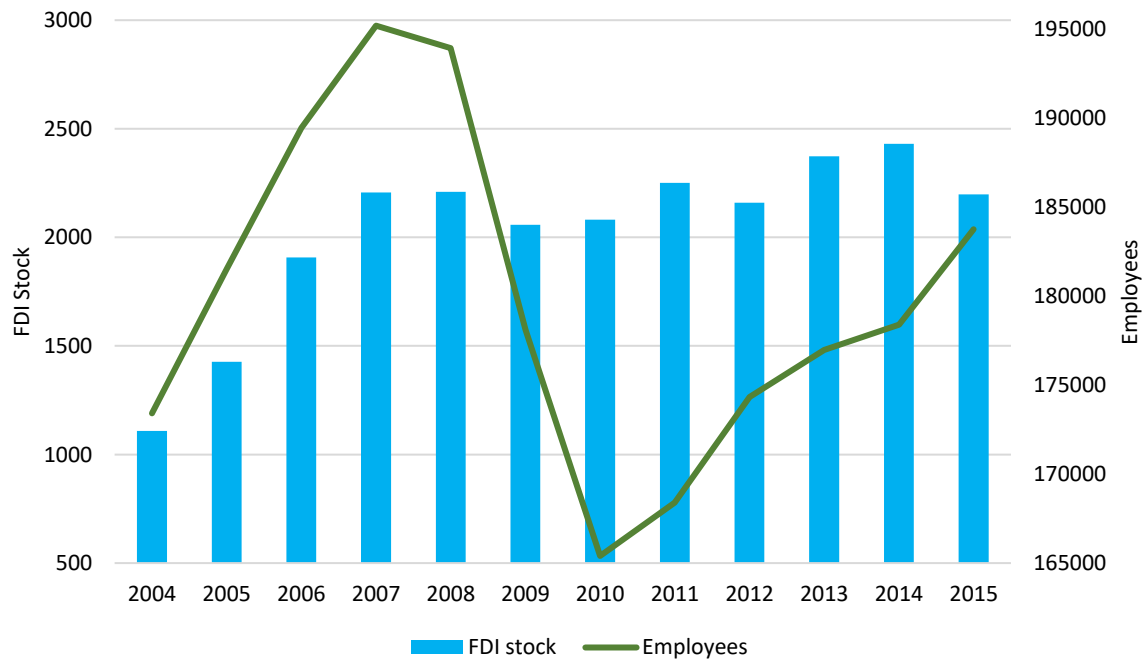
Figure 5. FDI and Employment in Wood and Furniture

But take the food sector, with no visually identifiable pattern:

Figure 6. FDI and Employment in the Food Industry

The food sector looks uncertain because it can attract both market-seeking and efficiency-seeking FDI. The effects vary accordingly. Horizontal FDI is especially likely in the food industry due to the multiple barriers to trade (Hudson *et al*, 2005). If that is the case, FDI should create a significant amount of jobs and benefit other firms in the sector (Krugman, 2015 and Liebscher *et al*, 2007).

This chapter has demonstrated that there is no unique correlation between FDI and employment across sectors. High-technology and low-technology sectors can be visually grouped together. One sector is perhaps not homogenous enough to warrant a single motivation or entry mode. Some insights can be obtained from this chapter, but an accurate picture of each sector would require data on domestic firms and market structure (Muendler and Becker, 2010). It is certain that sectors vary in their employment and FDI. Since FDI does not constitute the full picture, in the following chapter I attempt to formally weigh my hypothesis by estimating an equation across all sectors. I expect substantial heterogeneity across sectors.

5. Results

The previous chapters warned against a straightforward prediction of the size and direction of the effect of FDI on employment. The graphs mapping FDI stock against corresponding employment hinted at a causal relationship, which nonetheless varies widely across sectors. A number of the industries seem to suffer in the periods following an increase in FDI, whereas in others we notice a proportional increase in employment. In order to investigate the effect acros sectors, and the relative influence of FDI, I estimated a simple linear equation which explains the number of employees by FDI stock. I added sectoral GDP and average sectoral wage as control variables. I first estimate the model with a fixed effects specification with Generalized Least Squares and afterwards the same with a random effects (RE) specification. The results are as follows:

Table B. Fixed and Random Effects Estimations

	FE	RE
	Number of employees	Number of employees
FDI stock$_{it}$	9.50562*	13.09635**
	(5.14260)	(5.10977)
Average Wage$_{it}$	-22.53062**	-27.70069**
	(10.79269)	(10.80050)
GDP$_{it}$	1.12743*	1.02835*
	(0.59772)	(0.58641)
Constant	1.71e+05***	1.72e+05***
	(1.47e+04)	(3.46e+04)
N		221
R	14	20
ρ	0.87	0.81

Note: Standard errors in parentheses,   * p<0.1, ** p<0.05, *** p<0.01

The Hausman test aims to determine whether the estimated coefficients obtained through each method differ. It allows one to select the model that performs best. It does so by using the difference, and difference in variances of the estimated coefficients, β_{FE} and β_{RE}. The null hypothesis is that the two estimates produced by the RE and the FE model are not systematically different whereas the alternative is that they are. If the null hypothesis is true then we should choose the RE model, as it is efficient under the assumption that the estimated coefficients are not systematically different. The Hausman statistic is $\chi_3^2 = (\beta_{FE} - \beta_{RE})' * [var(\beta_{FE}) - var(\beta_{RE})]^{-1} * (\beta_{FE} - \beta_{RE}) = 135.50$ and P>χ_3^2 = 0.0000. The probability that the test-statistic is above the critical value is smaller than 0.05 therefore we should reject the null hypothesis which states that the difference in the two coefficients is not systematic.

The Hausman test concludes the models are significantly different and suggests that the FE specification is consistent. I reported both because the estimated coefficients and standard errors are not substantially different.

5.1. Interpretation of Results

5.1.1. Model

The difference between the R^2 of the models is small: 6 points. Thus the independent variables included only explain a small proportion of the variation in employment across sectors and time. Additional factors influence the level of employment.

All the coefficients estimated are significant at least at 90% confidence level. The confidence could be increased in a repeated study. Romania attracts little FDI compared to other CEECs (Estrin *et al*, 1997). Combined with the short time of observation (12 years), we cannot expect a high coefficient size or significance. It was also highlighted in the descriptive statistics that FDI flows to different industries disproportionately. The effect on employment be due to unobserved features, such as multiple catching-up policies, rather than FDI only.

The sectors differ substantially in their initial employment and wages before FDI but perhaps the labour demand pattern is also specific to each. Differences could persist in the capacity of sectors to absorb technological improvements, or changes could occur in their production process. This is reflected in the low ρ.

5.1.2. Impact of FDI

The random effects model concludes that 13 extra employment contracts are created following a new unit of investment worth 1 million Euros (EUR) in one year, in any of the sectors studied. Alternatively, the FE model concludes that 9 extra employment contracts are suspected to be created by a new investment project worth 1 million Romanian leu (RON) in one year, regardless of the sector in question.

Employment responds positively to increases in FDI stock but the size of the response is small, especially if we consider that the stock is measured in millions of RON and the employment variable counts individual workers. Given that coefficients on both FDI stock and wage are larger in the random effects model, but similar in size, it can be inferred that a relationship between FDI and employment exists nonetheless the estimation method (model specification) is not sophisticated enough to capture its true dynamic. The results indicate that FDI destroys a lower number of jobs than it creates. An alternative explanation would be that FDI creates and destroys a similar number of jobs through direct and indirect effects, but that local firms create comparatively more jobs.

Does FDI increase employment through direct or indirect effects? Romanian firms have enough absorptive capacity to be a candidate for positive spillovers (Görg and Strobl, 2011). Onaran and Stockhammer (2008) suggest that more than 4 years are necessary for positive indirect effects spillovers to appear and Romania has received FDI for more than 20 years. A sensible assumption is then that transfers of know-how exist but they can only be approximated through the coefficient on FDI. I cannot split this coefficient into direct job creation and further effects. What is more, at some point in time, indirect effects, such as increased competition, can no longer be considered 'effects' since they modify the context in which local firms operate. Their prolonged presence will impact production process in the receiving sector, depending on factors outlined in the literature review, such as closeness between firms. The panel is quite short so that might or might not be an explanation.

We could also suppose that regional disparities in Romania, which are common in Europe and in transition economies (Balwin and Wyplosz, 2012), are an unaccounted for factor. For instance, FDI in *financial intermediation* is very likely located in leading urban centres thus attracting labour from other sectors. A competition between sectors is likely, further influenced by economies of scale and investor behaviour. This aspect has not been included in the model specification.

5.1.3. Relative Effect of FDI

Wages are the most powerful predictor in this model compared to FDI and GDP. The estimated coefficient of this variable is 10 respectively 20 points higher than on the other two. It has the highest significance, being reliable at both 90% and 95% confidence intervals. If FDI has a strong influence on wages, then there could also be some unaccounted for endogeneity.

In both models the impact of FDI represents half of that resulting from a change in wage. There are many aspects to FDI which compose its impact on employment. To reiterate, a market-seeking firm can both create and destroy jobs. In the previous subsection, I said that both direct and indirect effects exist, but to which extent? Take a fictive investment. Its effects depend on the interaction with a host of its own characteristics, firms and other external factors, such as existing structure of the market (Estrin *et al*, 1997). Are the indirect effects generated through vertical or through horizontal links? Do foreign investors open greenfield facilities, which create more jobs than brownfield ones, but then import intermediate products from Europe, thus hurting local suppliers? At the moment NIS releases data sparsely on investor entry mode, so the proportions cannot be verified. Or, outside of any strategic considerations, perhaps it simply does not make economic sense for investors to raise the quality of their products or improve relations with local suppliers. The investment might create profit anyway due to low wages or low transport cost. Thus it is hardly surprising then that FDI fares worse than the other variables in explaining changes in the quantity of employment. The FDI variable encapsulates too many explanations, so its relative size and interpretation are limited.

Nonetheless, the estimated coefficient on FDI is surprisingly small, given that Romania is one of the Eastern European economies with the highest ratio of gross capital formation through FDI to total gross capital formation (Estrin and Uvalic, 2016; EBRD, 2004). This may have led us to expect that a small amount of foreign investment would have had a large impact, given its importance in the total quantity of new investment.

A connected explanation is that, while FDI indeed created new jobs, competition increases for Romanian firms. The literature highlighted some instances where new investors drive out local firms. A brain drain (Estrin *et al*, 1997) might have occurred from local to foreign-owned affiliates. Additionally, the cost of compliance with European regulation is likely to augment competition faced by Romanian firms and (Hanzl-Weiß, 2004) and especially by smaller firms (McIntyre and Martin, 2013). Knowing that Romanian firms also 'traditionally' exhibit decreasing returns to scale (ibid.), they are liable to be harmed by better performing entrants. An illustrative example is that Romanian

construction firms exhibit decreasing returns to scale (McIntyre and Martin, 2013), but FDI stocks are still high in this sector.

Perhaps foreign investors simply replace local firms. To come back to the formulation I used in the introduction, thinking of foreign investors as interfering with the demand for employment of locals might not be the correct perspective. Their implantation in certain sectors has long-lasting effects thus effectively constituting part of the national labour demand, rather than an addition or a disturbance.

5.2. Further Analysis: Sectoral Dummies

Since I suspect heterogeneity across sectors is important, and the FE model does not analyse variation across sectors, I explore it further. I added 20 sector dummies to the RE model so as to avoid multicollinearity with the constant sector. I reported here only the significant sectors:

Table C. Random Effects Model with Added Sectoral Dummies

	Coefficient
Energy and gas	-6.12e+04*
	(3.29e+04)
Transportation	1.85e+05***
	(2.83e+04)
Construction and real estate	2.39e+05***
	(3.65e+04)
Professional and support services	1.76e+05***
	(3.35e+04)
Telecommunication and post	-1.12e+05***
	(2.96e+04)
Trade	6.46e+05***
	(3.77e+04)
M. Other	-1.03e+05***
	(2.79e+04)
M. Machinery	-4.69e+04*
	(2.77e+04)
M. Computers and electronics	-5.35e+04*
	(2.85e+04)
M. Textile, clothing, leather	3.08e+05***

	(2.93e+04)
M. Wood and furniture	**5.24e+04***
	(2.90e+04)
M. Cement, glassware, ceramics	**-7.48e+04*****
	(2.85e+04)
M. Food, beverage and tobacco	**5.39e+04***
	(3.00e+04)
M. Metallurgy	**-8.98e+04*****
	(2.96e+04)
GDP_{it}	**0.47912**
	(0.51587)
Average Wage$_{it}$	**-19.16993****
	(9.14605)
FDI stock$_{it}$	**11.00487****
	(4.67514)
Constant	**1.31e+05*****
	(2.53e+04)
Number of observations	221
R^2	0.9251
Sigma-e	57 095.895

Standard errors in parentheses,   * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Compared to RE estimates, the coefficient on FDI decreased by 2 points, that on wage increased by 8 points. GDP was downgraded from a significant coefficient of 1 at 90% confidence to a non-significant one below 1. The ranking of coefficients is unchanged.

We can see that compared with the constant sector, *other manufacture and services*, 14 sectors out of 20 reported are significant. Most of them are significant at a 99% confidence interval. The coefficients reported are sometimes important, for instance -6.1 on the energy sector, -7.4 on cement, -8.9 on metallurgy. These sectors are different from the constant. Eight out of fourteen sectors reach almost the same size of the FDI coefficient. Most of them are significant at 99% confidence level. This supports my hypothesis that the effect of FDI varies according to the receiving sector.

5.3. Specific Areas for Improvement

We could interpret the coefficients of FDI as showing that, in the short term, the current *stock* of FDI feeds less into the rest of the economy as opposed to its lagged values. A dynamic panel data model could result in higher estimated coefficients. Another way to investigate the effect of FDI would be to use changes in GDP, employment, wage and stocks.

Exports would have been a valuable addition to this regression. I chose not to include them as the NIS records exports *of goods* for clearly service-oriented sectors, and only started collecting data on exports of services in 2013. Additionally, it provides the investors' origin, and it would be interesting to include this as a dummy.

Had the RE been adequate, we would be sure that different sectors would require different stocks of FDI according to the sector's features in order to respond with an increase or decrease in employment.

6. Conclusion

Foreign direct investment, regardless of its microeconomic dynamics, has been shown to predominantly result in job creation. Within each sector, the creation of jobs exceeds the destruction, either through investment-specific features or through effects on local firms and workers or, most probably, an interaction between the two. The coefficients on FDI are positive and significant in all the three estimated models. The additional model brought more certainty regarding my hypothesis that FDI impacts employment differently according to the receiving sector, but cannot entirely confirm it. Having to use additional regressions also means that there is a lot to improve in my methodology.

The dissertation answers the question, nonetheless it could be answered more precisely. I found many equally plausible explanations when I attempted to explain the movements in employment by reference to one coefficient on FDI. I could only speculate on which effects compose the estimated coefficient. Some of the uncertainty is inevitable, seen the lacunary data from the NIS. But the statistical method can be improved upon, especially the model and the quality of the variables. My hypothesis of diversity of the impact of FDI across sectors conflicted with the result of the Hausman test, which suggested that the effect of FDI on employment is constant across sectors. I presented plausible explanations and provided additional support of my hypothesis in the results chapter. My methodology is an additional reason why I failed to prove it with certainty. My dissertation went from microeconomic empirical studies to a larger scale, sectoral conclusion. The methodology assumed that international business and economic empirics are complementary rather than conflicting. This method can be criticized. It represents an additional justification for why the coefficient on FDI is comparatively low.

The results point to a direction of future research on this question. Firstly, different data is needed in order to elicit the sectoral dimension of FDI with a greater degree of certainty. Secondly, I discussed the service sector very little. Unavailability of data was limiting felt limited and most papers I reviewed were not giving a lot of attention to FDI in services in transition economies. Finally this dissertation managed to question the relationship between economics and economic policy-making in the area of foreign investment in Romania, a transition economy. Can sectoral or microeconomic studies of FDI constitute a basis for *national* foreign investment policy? Through this investigation I have shown just how many inexactitudes can arise at each stage of the answer.

7. Appendices

Appendix *A*

Detailed Variable Construction

These are the calculations I performed on separate employment entries. I identified each time series by the same index as in the NIS database. For each variable I used data from the FOM104G and FOM105H series, and occasionally from FOM108G.

- Employment in food, beverage and tobacco was obtained by adding the series 10. *Food production* + 11. *Beverage* + 12. *Tobacco*.

- Employment in oil processing, chemicals, rubber and plastic was obtained by adding the employment series 19. *Crude oil processing* + 20. *Manufacture of chemical products* + *Manufacture of basic and complex pharmaceutical products* + *Manufacture of plastic and rubber*. I included pharmaceuticals in *chemicals* because the number of employees in each category is sometimes merged. I could not find out what was the methodology used for this sector in the FDI stock recording, so I would rather include too many employees and question the high coefficients than accidentally exclude them.

- In order to obtain the number of employees in manufacture of computers and other electronics, I added 26. *Manufacture of personal computers, optical and electronical objects* + 27. *Manufacture of electrical equipment and electronic parts.*

- Employment in wood and furniture was obtained with the series 16. *Processing of wood and products based on wood and cork* + 31. *Furniture.*

- For textiles, clothes and leather I used 13. *Manufacture of textiles* + 14. *Manufacture of clothing* + 15. *Processing and creation of leather products, bags and fur products.*

- Employment in construction and real estate transactions is easily obtained by adding F. *Construction* + L. *Real estate transactions.*

- The FDI in the manufacturing sub-division cement, glassware and ceramics is coupled with workers in *non-metallic* manufacturing.

- As the FDI in other does not have a correspondent in the sectoral employment, I match it with employees in 'other' services, private healthcare and entertainment firms with private capital.

GDP and Average Wage Variable Construction

The same method was used to obtain the other independent variables. I aimed to obtain the same level of aggregation and to match the employees in one sector clearly defined with their average

wages and with the incoming FDI. Bringing GDP to the same level of aggregation as employment and FDI stock was relatively straightforward. This was not the case for wages. I used FOM118B and FOM118C for wages. FOM118B was discontinued, and I could only obtain it by using the more sophisticated FOM118C which presented average earnings in each sector according to education and professional qualification. Since the methodology presented on the NIS website was unclear to me, I first created two alternative series to continue it. For one I used the wages of low-qualified workers and for the other the wage of average qualified workers I then compared how each matched with the initial one. Then I chose the one which matched most sectors without a 'jump' – that is, the average one.

Appendix *B*

Codification of sectors in the sudopanel

1. *M. Mining*

2. *M. Metallurgy*

3. *M. Food, beverage, tobacco*

4. *M. Means of transport*

5. *M. Cement*

6. *M. Wood and furniture*

7. *M. Textile, clothing, leather*

8. *M. Computers and electronics*

9. *M. Oil and plastic*

10. *M. Machinery*

11. *M. Manufacturing, other*

12. Trade

13. Financial intermediation

14. Telecommunication and post

15. Professional and support

16. Construction and real estate

17. Transportation

18. Hotels and restaurants

19. Energy

20. Agriculture, forestry and silviculture

21. Other

M indicates that the sector is a subsector of the manufacturing industry.

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