
Factors affecting technology spillovers from Multinational Enterprises (MNEs) in backward linkages in the Turkish manufacturing sector: lessons for Investment Promotion Agencies (IPAs)

by
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Abstract

It is widely accepted by developing countries that technology and knowledge can spill over from Multinational Enterprises (MNEs) to local firms. However, this outcome is not automatic; a broad range of factors affect the existence of such spillovers. This multiple study examines the MNE-related factors which might affect technology spillover channels and the spillover potential for local subsidiaries, particularly in backward linkages, within the specific context of the Turkish manufacturing sector. The evidence suggests that not all MNEs have the same spillover potential and different characteristics of the MNEs affect the spillover channels differently. This implies that a “one-size-fits-all” approach to increase technology spillover benefits of MNEs is sub-optimal and a customized approach is required.

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Introduction

Foreign Direct Investment (FDI) is widely accepted as a cross-border investment with a long-term and lasting interest evidenced by at least 10% voting power (OECD, 2008). It has been increasingly regarded as one of the most significant catalysts of economic development, especially for developing countries.

Along with various targeted benefits (e.g. job creation, capital accumulation and contributions to tax revenue), one of the most important rationales behind the efforts of countries to attract Multinational Enterprises (MNEs) is technology and knowledge spillovers which might occur as a result of the direct and indirect interactions between MNEs and local firms, due to their firm-specific competitive advantages over domestic firms in the host country. In this case study, we will use the term “*technology spillovers*” to capture any effects which might directly or indirectly raise the productivity of local firms through intentional and unintentional knowledge exchanges with MNEs, including product, process and distribution technology and management and marketing skills.

Empirical studies on FDI spillovers mainly focus on intra-industry (horizontal) and inter-industry (vertical) spillover effects. Horizontal spillovers refer to the benefits to local firms in the same industry; vertical spillovers are the benefits to local firms operating in the same supply chain, particularly in forward and backward linkages. There is a stronger consensus on the existence of vertical spillovers, especially in backward linkages. However, positive spillovers from FDI are not automatic and the presence of MNEs does not guarantee such benefits. Therefore, understanding the determinants which affect this process and what kind of MNEs can create more spillover effects is crucial for policymakers and IPAs.

This country case study¹ examines six MNEs investing in Turkey to assess different types of MNEs in terms of its role in its MNE network, entry mode/ownership structure, origin of country, the age of MNE and its proximity to their suppliers to understand which types of MNEs might have more spillover potentials. The research examined documentation and undertook in-depth interviews with management of the six companies. The small sample size allowed the researcher to thoroughly examine the MNEs’ motivations and verify outcomes.

The objective of this study is to provide some insights into what factors seem to significantly influence spillovers, in particular investors’ strategic thinking on engagement with local suppliers. With such information, investment promotion agencies may be able to assess more accurately which foreign investors are more likely to generate spillovers to better target their resources; and which investment policies may inadvertently be creating barriers to spillovers.

¹ This case study is adapted from “How do MNE-related factors affect technology spillovers in backward linkages in Turkish manufacturing sector?” by Akyuz, S., (Master’s thesis, Birkbeck, University of London, 2016) published by ILO in 2018.

The MNEs studied

The six MNEs studied include *Fiat TOFAŞ* and Eldor Corporation. The other 4 companies requested anonymity to speak more frankly and therefore are referred to here as *North American-1*, *North American-2*, *European* and *East Asian*.

Three companies are greenfield, two are greenfield joint ventures and one is a merger/acquisition. Three are 100 percent foreign-owned. Half are “asset exploiting”, meaning their activities replicate the existing competencies of the parent MNE. The other half are asset augmenting, i.e., their activities develop knowledge within the subsidiary rather than transferring and adapting the knowledge of the parent company. Although all six companies export, five produces mainly for export while the *East Asian* company produced mainly for the domestic market. Half of the MNEs had suppliers concentrated in one geographical area in Turkey while the local suppliers to the other three MNEs were more widely spread out. The major characteristics of the companies are presented in *Table 1*.

Table 1: Summary of the main characteristics of the companies reviewed

	North American-1	North American-2	European	Fiat TOFAŞ	Eldor Corp.	East Asian
Origin country of	USA	USA	Germany	Italy	Italy	South Korea
Entry mode	Greenfield	M&As	Greenfield	Greenfield-JV	Greenfield	Greenfield -JV
Current ownership structure	%100 foreign	Equal shares with a local partner	%100 foreign	38.8% (Fiat), 38.8% (Koç Holding), 22.4 (free float)	%100 foreign	Equal shares with a local partner (50/50)
Entry year	1989 (old)	1959 (old)	2005 (new)	1968 (old)	1991 (old)	2000 (new)
Asset-exploiting vs. augmenting	Asset-exploiting	Asset-augmenting	Asset-augmenting	Asset-augmenting	Asset-exploiting	Asset-exploiting
Market Orientation	~ 87% export	~ 70% export	100% export	~ 72% export	~ 90% export	~ 30% export
Geographical concentration of local suppliers	Relatively dispersed	Relatively concentrated	Relatively concentrated	Relatively concentrated	Relatively dispersed	Relatively dispersed

Source: Company websites, company reports and interviews

Origin of MNE

All the MNEs interviewed reported that their country of origin does not affect much their local-sourcing preferences. For instance, when we compared the two North American companies, we saw that *North American-2* seems to be locally-embedded and creates substantial spillover effects in Turkey while *North American-1* seems more footloose and creates limited effects. Similarly, when we compared three multinationals from the European Union, we saw that while *European-1* and *Fiat TOFAŞ* seems to have created large local supplier base in Turkey, *Eldor*'s local-sourcing seems relatively low.

However, two MNEs pointed to cultural differences between home and host countries which could be significant impediments to spillovers. *East Asian* explains: "South Korean companies are very successful in production in their home country but they generally have difficulties in their production investments [in] Turkey as they can't overcome the problems arising from cultural differences." And *Fiat TOFAŞ* noted that the cultural proximity between Italy and Turkey positively affects their relationships with the local suppliers: "With respect to culture, Italy is closer to Turkey than France and Germany and this closeness is an advantage for the suppliers."

Ownership Structure

Three of the MNEs studies are wholly foreign-owned subsidiaries (*North American-1*, *European* and *Eldor*) and three are joint ventures with local partners (*North American-2*, *Fiat TOFAŞ* and *East Asian*). The three subsidiaries which have local partners confirmed that the existence of the local partner definitely affects their sourcing preferences and increases their local-sourcing. *North American-2* mentioned that the pre-existing supplier base of the local partner automatically increased their local content in the first years of the partnership. Similarly, *East Asian* argued that without the local partner, their local-sourcing would not be at today's level.

However, the nature of these partnerships seems to also affect spillovers. While of the MNEs involved in partnerships (*North American-2* and *Fiat TOFAŞ*) do not compete with their local partner, *East Asian* is a partnership composed of two rival giants (XXX and YYY) in global markets, one of which happens to be local. This partnership structure appears to limit the backward spillover effects especially in allowing the 'exporting' mechanism. *East Asian* (2016) explains how these dynamic impacts spillovers:

"...Although XXX and YYY got into a partnership in XXXXX business, they are competitors in XXXXX sector in the world. XXX does not want to share information about the structure of its suppliers, the cost structure of its procurement activities and on how it manages these suppliers with YYY. In fact, YYY also does not share much information about their suppliers' structure and how it manages them."

Customs Unions

Other things being equal, one might expect that European multinationals create more backward linkages in Turkey than their North American and East Asian counterparts, based on the existence of a Customs Union which eliminates tariffs, non-tariff barriers or quotas for goods imported from the EU, as well as Europe's geographical, cultural and regulatory proximity to Turkey. However, the data did

not find robust evidence to support this generalization. For instance, when we compared the two North American companies, we saw that *North American-2* seems to be locally-embedded and creates substantial spillover effects in Turkey while *North American-1* seems more footloose and creates limited effects. Similarly, when we compared three multinationals from the EU, we saw that while *European-1* and *Fiat TOFAŞ* seems to have created large local supplier base in Turkey, *Eldor*'s local-sourcing seems relatively low. Also, all the interviewees in our sampling reported that their country of origin does not affect much their local-sourcing preferences.

To be clear, the customs union between Turkey and the European Union seems to impact the 'foreign' procurement activities of some of the MNEs' studied. For example, *Fiat TOFAŞ*, whose local content level is around 73%, sources 97% of its imported inputs from Italy; and *North American-1* sources 75% of their imported inputs from the EU and the agreement affects their foreign procurement activities. However, Turkey also has a Free Trade Agreement with Korea and yet it does not appear to affect the local content level of *East Asian*; when they find a suitable local supplier for a component previously sourced from Korea, they easily change the supplier and start working with the local one.

Spillover channels

The study found that all six MNEs directly or indirectly improve the capacity and capability of their suppliers in various ways. However, the spillover effects varied significantly depending on the channels for spillovers created by MNE engagement with local enterprises. The channels which were found to exist among the six MNEs studied, together with some cross-cutting factors which seem to enhance further one or more of these possible channels, are discussed below.

Supplier-Buyer Engagement

Through significant levels of engage, the MNEs studied directly help their local suppliers to improve their production capabilities. Forms of engagement identified which directly transfer skills include training, technical workshops, routine quality controls, tracking the suppliers' performance, direct intervention into the local suppliers' production processes and sending temporarily its own employees to local suppliers to improve their performance. Joint product development may also provide opportunities for hand-on learning.

Other forms of engagement help suppliers to facilitate operationalizing technology and knowledge. Direct financial support helps local suppliers to pay for investments, particularly where they may not have ready access to credit. Bundling input needs of local suppliers to increase their purchasing power reduces the cost of investments for upgrading production; or reduces the cost of inputs which frees up resources to invest. And long-term agreements between the MNE and local supplier provide assurances of an adequate return on investment.

All six MNEs provide training, especially on quality management, production methods and human resources management; and implement routine controls by Supplier Quality Engineers. *North American-1*, *North American-2* and *Fiat TOFAŞ* also hold technical workshops to train all suppliers

together on some aspect(s) of production. All but *European* track their suppliers' performance, especially in terms of quality, delivery and financial conditions. *North American-2*, *Fiat TOFAŞ* and *Eldor Corp.* also intervene directly in their local suppliers' production processes which need additional support. *North American-2*, *Eldor Corp.* and *East Asian* send their own employees temporarily to local suppliers to improve their performance. *North American-2*, *Fiat TOFAŞ* and *East Asian* develop products jointly with local suppliers.

Only *Fiat TOFAŞ* provides direct financial support to local suppliers, but *Fiat TOFAŞ* and *East Asian* both buy on behalf of local suppliers to reduce costs and ensure the quality of raw materials. All of the MNEs interviewed generally prefer to work with one supplier for each line of inputs to develop long-term relationships with their suppliers. *Table 2* provides more details about these mechanisms and examples provided in survey responses.

Table 2: Supplier-Buyer Relationship mechanisms

Mechanism	In which MNEs?	Example quotation
Trainings especially on quality management, production methods and human resources management	North American-1 North American-2 Eldor Corp. Fiat TOFAŞ European East Asian	We organize various trainings in areas where suppliers need to improve themselves. E.g. in 2015 around 500 employees of our local suppliers attended to our training programs especially regarding quality management in TOFAŞ Academy (Köylü, 2016).
Technical workshops organized by MNEs to gather all suppliers	North American-1 North American-2 Fiat TOFAŞ	We have Cost Reduction Directorate in our company. In this directorate, we sometimes benchmark the competitor vehicles and we organize technical workshops where we also invite our local suppliers to discuss how we can reduce costs and increase the efficiency of our production processes (Köylü, 2016).
Routine controls by Supplier Quality Engineers of MNEs	North American-1 North American-2 European, Eldor Fiat TOFAŞ East Asian	Our company has a team of 24 experienced engineers who are only responsible for around our 300 suppliers. Each engineer is responsible for 10-12 suppliers and their sole responsibility is to visit the suppliers and help them upgrade technical capabilities (North American-2, 2016)
Tracking the suppliers' performance especially in terms of quality, delivery and financial conditions	North American-1 North American-2 European Eldor Corp. Fiat TOFAŞ East Asian	We track our local suppliers' performance with scorecards with regards to their logistics, quality and financial conditions (North American-1).
Direct intervention into the local suppliers' production processes	North American-2 Fiat TOFAŞ Eldor Corp.	For us, the cleanness of our components is very critical. We told our supplier that dust particles on the metal component shouldn't be more than

		XXX micron but they couldn't do that. As that supplier was very strategic for us, we rolled up our sleeves, inspected their production process, re-designed their process and developed a new system on how they can ensure this cleanness (Tanyu, 2016).
Sending temporarily its own employees to local suppliers to improve their performance	American-2 Eldor Corp. East Asian	...Especially when one specific product is developed, we send our technical employees to their facilities for 3 months, sometimes even for 6 months till the process is set on the right track (East Asian, 2016).
Joint product development	North American-2 Fiat TOFAŞ East Asian	We have two groups: The first group is "make to print" suppliers. We directly send them the specifications and place an order with them. The second group is, as we call them, "full-service suppliers" which participate in our product development process from the beginning and closely work with our engineering department and other suppliers (North American-2, 2016).
Direct financial support to local suppliers	Fiat TOFAŞ	When there is an investment need in our local suppliers' facility and if it is beyond its financial capabilities, the issue is evaluated in CEO-level and sometimes we provide direct financial support to encourage their improvement (Köylü, 2016).
Bundling input needs of its local suppliers and buying them on behalf of local suppliers to reduce costs of upgrades or free up resources to invest in upgrades.	Fiat TOFAŞ East Asian	...For instance, we bundle all of sheet plate needs of our suppliers, bargain and buy on behalf of them to take advantage of volume effect and decrease input costs (Köylü, 2016).
Making long-term agreements with a preferred local supplier which reduces investment risk.	North American-1 North American-2 European Eldor Corp. Fiat TOFAŞ East Asian	We generally prefer to work with one supplier while sourcing one particular component which helps you to develop long-term relations with your supplier and minimise the risk for local suppliers (European, 2016).

Source: Author's creation

Labour mobility and spinoffs

Technology, knowledge or skills may spill over to local suppliers through labour mobility or spin-offs established by former employees of the MNE. In our cases, this rarely happens in practice. *North*

American-1 and *North American-2* reported that even if there might be exceptional cases, these mechanisms are not very strong in their operations; and evidence indicates that these mechanisms have limited or no impacts on spillovers in the cases of *European*, *Eldor Corp.* and *East Asian*. The one exception is *Fiat TOFAŞ*, where these mechanisms seem to be quite effective in facilitating spillovers:

“Among our 150 local suppliers, there are around 20 companies whose founders are the former employees of *Fiat TOFAŞ* and we also have many suppliers where our former colleagues are General Managers, Quality Managers or in other important positions.”

Stimulating a more competitive local environment

“International follow-source suppliers,” which follow MNEs to host countries, can serve to stimulate competition and thereby enhance the production processes of local suppliers. Among the MNEs studied, *North American-1*, *European* and *Eldor* reported that they do not have such suppliers while *North American-2* and *East Asian* have very few. The one exception is *Fiat TOFAŞ*, which has around 35 international follow-source suppliers out of 150 local suppliers; but these suppliers’ share in *Fiat TOFAŞ* procurement turnover is relatively limited, at around 20%.

Theory also suggests that MNEs might indirectly increase competition by encouraging new entries; but there was not enough data to test this hypothesis with the MNEs studied.

Demonstration Effect

We found strong evidence (especially in *European*, *North American-2*, *Eldor Corp.* and *East Asian*) that local suppliers might improve their production, marketing or other capabilities by observing and trying to apply best practices of their customer MNEs. For instance, during the interview, the interviewee from *East Asian* stated:

“We have many suppliers which observed our production processes and learnt the methods used in our plant, like 6 Sigma process, and improved themselves. And then, they were even awarded in many platforms in Europe or here and there...”

Collaboration between suppliers of the MNE

We found that collaboration between local suppliers in MNE-led joint projects is a very common mechanism for spillovers, especially for *North American-2*:

“Yes... our suppliers, when they need, share information with each other. Actually, we also encourage them to do so. When we see one supplier which

can work and develop one particular product better with any of our suppliers, we bring them together. The companies which accept such offers and cooperate always make more progress...”

Exporting

All but *East Asian* are export-oriented. Of these, *North American-2* and *Fiat TOFAŞ* seemed to generate export opportunities for their suppliers; but the others did not. *East Asian* was export-oriented but shifted more recently to domestic-market-oriented; the shift had no apparent effect on its sourcing preferences and hence spillovers.

For those suppliers who did have access to export opportunities, the evidence suggests that being a supplier of one particular MNE opens opportunities for finding new customers abroad. This is especially true for suppliers to *North American-1*, *North American-2* and *Fiat TOFAŞ*. One of the suppliers described the process as follows:

“We have been supplying to [*North American-1*] for three years. But before then, we also worked with them closely for about 2-3 years to develop the product they need... And now, with the help of [*North American-1*], we started sending these products to their other facilities in Romania, France, Spain and Portugal.” (Ertürk, 2016)

North American-2 further explained the process:

“... When we start working with a company, we start tracking its performance in different categories. When their performance exceeds a certain threshold, we give them a prize and tell them that from now on, you are titled as [*North American-2*]’s ‘favoured supplier’. As we use the same supplier system with global [*North American-2*], all the other facilities around the world, for example, in Asia-Pacific, Africa, North America, South America and Europe see from the system that this supplier has reached that level. And then when they need that type of product, they start collecting the offers from these companies.”

In the case of *Fiat TOFAŞ*, around 90 of their 150 local suppliers send products to other Fiat facilities around the world. Supplying to one MNE subsidiary appears to be regarded as a reference by other subsidiaries (and likely as least some other big companies) which might increase their chance to reach these customers.

Procurement strategy of MNE

The procurement strategy of the subsidiary may also impact opportunities for local suppliers to access foreign markets. When MNEs employ a more centralized sourcing strategy, headquarters bundles all

needs of all plants around the globe and make global agreements binding all of their subsidiaries, even when cheaper and/or higher quality inputs are available locally:

“...Sometimes HQs bundle all needs of all plants and made an agreement with one global supplier. HQs inform that Turkey, China, Brazil does not matter, all will buy from that supplier. Due to such kind of agreements, we sometimes have to source from abroad.” (European)

Although centralized procurement limits the potential for wider-spread spillovers to a larger number of local producers, a local company which manages to become a supplier to the subsidiary becomes part of their globally-implemented procurement strategy with access to foreign markets. *North American-1*, which manages its procurement activities globally with relatively low local content in Turkey, explains: “...When we find reliable and successful local suppliers from Turkey, we want them to supply to our other facilities in Europe and during this process, we mostly try to work with one supplier for a particular product.”

Asset augmenting vs. asset exploiting

Asset-augmenting MNEs develop knowledge within the subsidiary while asset-exploiting MNEs generally transfer and adapt the knowledge of the parent company. *North American-2*, *European* and *Fiat TOFAŞ* are asset augmenting while *North American-1*, *Eldor Corp.* and *East Asian* are asset-exploiting. Not surprisingly, the asset augmenting MNEs have higher local content ratios than the asset-exploiting ones, although other factors may also be affecting these ratios. The higher local content creates more channels for those MNEs to generate spillovers to their local suppliers.

However, asset-augmenting subsidiaries also generate more spillovers through other mechanisms. Because they are developing knowledge locally, they employ more high-qualified people and offer more favourable environments for the employees to gain better skills which increases the chances of spillovers through labour mobility and spin-offs. We found this to be the case with *Fiat TOFAŞ*.

Asset-augmenting subsidiaries also collectively integrate their suppliers into product development processes from the beginning, which creates an environment for local suppliers to cooperate and learn from each other. This was particularly evident in the case of *North American-2*.

Additionally, when the product or product-related technology developed by asset-augmenting subsidiaries are exported to other subsidiaries abroad, the suppliers which have participated in the development phases are more likely to export to these countries as well. The interviewee from *North American-2* mentioned this issue:

“...The suppliers which we call “full service suppliers” get involved in our product development processes from the beginning... For instance, XXX model which was mostly developed in Turkey was going to be produced only in our factory, but because of the growing demand for that car in North America, it started to be

produced in a factory there. And many components are still supplied by our suppliers in Turkey (*North American-2*, 2016).”

However, if the subsidiary is too disconnected from the global network of the MNE, this may decrease spillover potential. *North American-2* and *Fiat TOFAŞ* have substantial spillovers because they manage to be both locally embedded in Turkey’s automotive industry and at the same time globally embedded in their own MNE-network, helping local suppliers to extend their market reach: “...The more we get into [*North American-2*]’s global network, the more chance our local suppliers have to get into their supplier base.” (*North American-2*, 2016)

Age

Age—the length of time that the subsidiary has existed in the host country—seems to positively affect the potential backward spillover effects. The six MNEs studied revealed two important reasons which might explain why.

First, the subsidiary might require time to prove itself and strengthen its position within the MNE-network so that it gains autonomy over its procurement strategy, enabling it to source more locally. Second, time allows the subsidiary to overcome the ‘liabilities of foreignness’ (Zaheer, 1995) which can impede local linkages. As subsidiary and local producers get to know each other over time, it is easier to establish and develop sound relationships with local actors. This was particularly true for *North American-2* and *Fiat TOFAŞ*.

Two factors were identified which make age of the subsidiary less relevant: pre-existing commercial ties to local producers and the stability of technology. MNEs which invest locally precisely to be close to their suppliers already have relationships. In such cases, the cluster or sector as a whole is likely to be relatively more developed, with numerous firms which are well positioned to also source to the MNE. Consequently, spillover effects are more immediate because there is no need for a trial period or learning curve, but at the same time less transfer may occur between the MNE and the already strong local suppliers. This is the case with *European*.

Likewise, local suppliers which operate in a sector where the technology is more stable and does not change much year by year are less likely to benefit from active knowledge transfer. This point is explicitly mentioned by the interviewee from *North American-2*:

“...The issue of for how long we have been working with one supplier does play an important role, for sure! The more we know the people and the more we work with them, the more knowledge spills over. However, here, there is another important issue: in which product line we are cooperating. For instance, in more conventional product lines such as metal casting or forging, there is a stable and mature technology there. And the technology doesn’t renew itself and there are certain criteria or metrics there. In these sectors, even if we have been working with a

company for a very long time, there is a limited knowledge, technology transfer.”
(*North American-2*, 2016)

Geographical Proximity

Geographical proximity of the six MNEs to their local suppliers plays an important role in spillovers. *Fiat TOFAŞ* is located in Bursa, where more than half its local suppliers (77 out of 150) also are located; and most of its other suppliers are located within 200km. As *Fiat TOFAŞ* explains, geographical distance affects their supplier selection processes and their relationships with them:

“...Geographical distance of the suppliers really affects the relationship between us. I can give Konya as a concrete example. We added a supplier from Konya [500km to *Fiat TOFAŞ*'s plant] into our supplier base in 2008 and in 2012 we had to stop working with them. This was not because we weren't satisfied with the supplier's performance. But the distance affected the quality of our relationships. That's why, now as the geographical distance creates problems in intervening in possible quality problems, we don't prefer the suppliers very far away from us.”

It seems that geographical distance hinders backward technology spillovers through impeding supplier-buyer relationships, labour mobility and demonstration effects. Clusters or industrial districts where MNEs are in close proximity to a range of potential suppliers may facilitate spillovers.

Type of industrial zone

In Turkey, free zones (unlike normal industrial zones) are exempt from customs taxes; and the movement of goods between the free zones and the rest of the economy is closely regulated. Consequently, the cumbersome administrative hurdles discourage MNEs from contracting with local producers outside the free zones when they can simply import what they need duty-free. Out of 6 MNEs studied, only Eldor Corp. is located in a Free Zone in Turkey and Tanyu (2016) explicitly underlined this issue: “...Due to the paperwork and cumbersome procedures at customs, it is sometimes easier to source from Italy than from a Turkish supplier in Turkey.”

Conclusion

In this case study of six MNEs investing in the Turkish manufacturing sector, we investigated how different characteristics of their operations affect technology spillover channels in backward linkages. All six MNEs contribute to backward technology spillovers, but the amount varies significantly.

The most effective mechanism for technology spillovers in backward linkages seems to be the *supplier-buyer relationship* between the MNEs and their local suppliers, which allows for the most direct interaction. Higher levels of *labour mobility* and *exporting* also had strong positive effects. Spillovers

were also present where there were *demonstration effects* and *collaboration*, but these mechanisms appear to be less significant.

Asset-augmenting subsidiaries generate more spillovers as they are more embedded locally; and the positive impact is further enhanced if they have a relatively strong position within their MNE-network which improves local suppliers' access to global markets.

Regarding the *ownership structure* of the MNE, we found that the existence of a local partner positively affects the subsidiary's local sourcing and its spillover potential. The existence of a local partner in the ownership structure might decrease the cost of finding suitable suppliers and managing them; as well as help the MNEs overcome the communication problems resulting from cultural differences. However, the *origin* of the MNE appears to have limited or no impact on local sourcing and spillovers, except there may be a slight influence if the home and host cultures are either very similar or very different.

The *age of the subsidiary* has an effect; spillover potential increases as it becomes more established locally. *Industry* also is a factor; MNEs which operate in the main industries are likely to generate more backward technology spillovers than the ones in the supplying industries. Local suppliers which are *geographically nearer* to the subsidiary seem to benefit more from its presence. *Free zones* which impede commercial interactions between the subsidiary and local suppliers obviously also eliminate any potential spillovers outside the zone.

The existence of commercial linkages does not guarantee technology spillovers from the subsidiary to local suppliers. Therefore, a deeper understanding of the spillover mechanisms might help policymakers who aim to increase the spillover potential of the MNEs. Strategies for promoting and developing these linkages should be more fine-tuned and customised by taking the different characteristics and strategies of MNEs into account, while bearing in mind that most of these characteristics are not static and might evolve over time.

IPAs seeking to increase backward technology spillovers may wish to either attract asset-augmenting MNEs or help the existing ones to develop such capabilities. In providing consultancy services to the MNEs in their site-selection processes, IPAs could accelerate spillover processes by attracting them into clusters.

Appendix A – Overview of the determinants of FDI spillovers



Appendix B: Interview Questions to the MNE and its local supplier

Questions to the MNE subsidiary	Questions for the local supplier
1. Could you please give us some information about your company regarding production activities, personnel number, ownership structure, market orientation etc.?	1. Could you please give us some information about your company regarding production activities, personnel number, ownership structure, market orientation etc.?
2. What was your company's primary motivation when it invested in Turkey for the first time? Domestic market? Raw material or inputs? Cost-reduction? Acquisition of a well-known brand, knowhow or anything else?	2. What is the main reason for the MNE to choose your company ? Cost or quality? Which one is more important? Or anything else?
3. For how long has your company had investments in Turkey?	3. For how long has your company been the supplier of MNE? Does being a supplier of MNE affect your production capabilities positively? Do you also supply to other subsidiaries of the MNE? And does being a supplier of this foreign company create other market opportunities?
4. How can you evaluate your subsidiary's position within the MNE-network in terms of production capacity, quality and productivity?	X
5. Do you have an R&D unit in Turkey? If yes, are these R&D outcomes transferred to other MNE subsidiaries or solely used in Turkey?	X
6. How can you evaluate your tangible and intangible assets ? Annually how many patents do you gain?	X
7. Approximately what percentage of your intermediary goods is supplied by domestic companies and follow-source suppliers ? (Explain the concept of follow-source suppliers!)	4. Approximately what percentage of your output is supplied to this MNE?
8. To what extent is your subsidiary autonomous about their activities in Turkey? Especially in selecting its suppliers?	X
9. (If it is export-oriented) Does the competitive pressure in export markets urge you to source internationally? Do you think that the companies which produce for international markets rather than domestic	5. Do you think the market orientation of the MNE affect your relationship with MNE and pecuniary/nonpecuniary benefits that you gain from the presence of the MNE?

market have more tendency to source globally?	
10. Does your company collaborate with its suppliers specifically on materials supplied by them? What kind of mechanisms are used in these collaborations? R&D collaboration, trainings, regular technical visits etc.	6. Does your company have collaborations with MNE in production processes? R&D collaboration, trainings, regular technical visits etc. Do you think these mechanisms help you to improve your capabilities?
11. Among the following channels , which one is the most experienced and effective channel? Buyer-supplier relations, labour mobility, competition among your suppliers, demonstration effects (suppliers see your good practices and try to implement them), collaboration (with your other suppliers), exporting with your direct or indirect assistance. (Explain them if needed)	7. Among the following channels , which one is the most experienced and effective channel for you to benefit from MNE's presence? Buyer-supplier relations (feedback mechanisms, high standard requirements or economies of scale effects etc.), labour mobility, competition with your rivals to be the supplier of that MNE, demonstration effects (you see MNE's good practices and try to implement them), collaboration with other suppliers of the MNE) (Explain each of them very well!)
12. What kind of factors play an important role regarding the origin of your company ? For instance, geographical distance between HQs and Turkey, cultural and regulatory differences, bilateral trade agreements such as Customs Union or Free Trade Agreements?	8. What kind of factors play important roles regarding the origin country of the MNE ? For instance, geographical distance between HQs and Turkey, cultural differences, bilateral trade agreements such as Customs Union or Free Trade Agreements? (Explain each of them!)
13. (for JVs) Do you think that your local partner plays an important role in finding and selecting your local suppliers?	9. Do you think there is a difference between being a supplier of wholly foreign-owned subsidiary and of Joint Venture ? How does this affect their sourcing preferences and possible technology spillovers?
14. How does ' time ' play a role in your relationship with your suppliers? Do you think that ' time ' and spillovers are positively associated?	10. Do you think the MNEs which have been in Turkey for a long time have more tendencies to source locally?
15. How does geographical proximity affect your relationships with your suppliers? Does this proximity affect your decisions in supplier selection processes?	11. Do you think that geographic proximity affects technology spillovers from the MNE to your company?
16. Does being in a Free Zone (outside the customs area but within the political borders) / Organized Industrial Zone (planned industrial zones inside of the political borders) affect your supplying preferences? (This question was added after the first interview.)	12. Does MNE's being in a Free Zone/Organized Industrial Zone affect your relationship with the MNE?

17. What kind of other factors may affect the technology spillover from your subsidiary to its local suppliers? Factors that hinder or facilitate the spillover effects? **Do you have anything else that you would like to add?**

13. What kind of other factors may affect the technology spillover from the MNE to your company? Factors that hinder or facilitate the spillover effects? **Do you have anything else that you would like to add?**

Appendix C – MNE characteristics in detail

North American-1

This North American company has around 120 production facilities in 32 countries and has around 173,000 employees all around the world. The company is originally from the USA but they have recently moved their HQs from the USA to the UK just due to tax incentives. It entered Turkey with a greenfield investment and set up a wholly foreign-owned subsidiary in Turkey in 1989 after having followed its biggest customer, General Motors. Now it has 3 facilities with more than 6,000 employees in Turkey. Moreover, the company operates in automotive supplier industry and exports almost 90% of its production. Moreover, we labelled this company as an asset-exploiting subsidiary since almost all the know-how in production comes from abroad and it does not have R&D units and patent applications in Turkey. Moreover, they do not have separate procurement departments in their production facilities and all the procurement activities are managed globally. It does not mean that the procurement activities are handled by HQs but means that they have category leaderships and each of these teams dispersed all around the world are responsible for one line of inputs.

North American-2

North American-2 has 67 production facilities in about 24 countries with almost 200,000 employees all around the world. Even though the company opened a factory in 1929 and then closed it down, the company re-entered Turkey in 1959 by acquiring only a small amount of shares of the domestic company and then increased its share year by year. Now it has an equal share with its domestic partner. The company is an OEM producer in automotive industry, namely, it produces vehicles for end-users. Therefore, its position in the value chain of the automotive industry is higher than *North American-1*. Further, it has around 10,000 employees in their three facilities in Turkey. Moreover, 70% of its outputs are exported and every year the company is ranked among top exporters in Turkey. As a result of the analysis of company documents and interviews, the company can be definitely labelled as asset-augmenting subsidiary for three reasons. Firstly, it has a very large R&D department in Turkey. Secondly, it is always among top 5 companies in terms of patent application in Turkey. Thirdly, it is one of the most important engineering centers of the global network and the products and systems that are developed in Turkey are frequently transferred to HQs and other subsidiaries. Moreover, as the interviewee mentioned, the subsidiary in Turkey is in highest level within the global network of the MNE in terms of cost, quality and productivity. Locally-sourced inputs constitute 75% of its procurement turnover excluding the engine. It might be easily argued that the company has a very high autonomy in their procurement activities.

European

European has 57 production facilities in around 28 countries and has globally more than 33,700 employees. The company belongs to a very large industrial conglomerate, and this business segment entered Turkey with a greenfield investment in 2005 and it is a wholly-owned subsidiary. Even though its other sister companies have had investments in Turkey for more than 100 years, we identified it as a “new” subsidiary as the interviewee also warned us by underlining many times that he was answering the questions on behalf of his company, not on behalf of the group of companies. Moreover, this company’s business segment is independent of others and very different from them. The company is in machinery sector and produces industrial products and systems especially used in industrial applications. The company has around 1,000 employees in their two facilities in Turkey and exports 100% of its production. Since they have R&D, routine patent applications (as a group of companies, they are always among top companies in terms of patent application) and the products or know-how developed in Turkey are usually transferred to other subsidiaries, it might be labelled as an asset-augmenting subsidiary. Their local content level in their production is around 55-60% and in their procurement processes, they closely work with the HQs and it can be labelled as moderately autonomous.

Fiat TOFAŞ²

Fiat Group has around 175 production facilities in about 25 countries and employs almost 240,000 people all around the world. The company entered Turkey in 1968 with a JV with the biggest Turkish industrial conglomerate (Koç Holding) and they have equal shares and around 24.3% of the company’s shares are traded in Stock Exchange. In Turkey, Fiat TOFAŞ has around 10,000 employees in 1 facility and they exported 72% of their production in 2015 and ranked as one of the biggest exporters of Turkey. Furthermore, Fiat TOFAŞ is in “golden level” which is the highest level according to World Class Manufacturing Index of Fiat. Its requirements are implemented in 175 Fiat plants and the facilities of its 350 suppliers and the plants are ranked according to their performance in terms of various factors such as quality, productivity and knowledge creation etc. Moreover, as they have a very strong R&D unit, they are among top patent applicants in Turkey and they transfer the created knowledge to other subsidiaries, we labelled it as an asset-augmenting one. Further, the company sources 73% of its inputs locally excluding the engine and gearbox and as confirmed during the interview by Köylü (2016), it is highly autonomous in their procurement activities.

² <http://www.tofas.com.tr/en/about/Pages/AboutUs.aspx>

Eldor Electronics³

Eldor (Italian) entered Turkey in 1991 with a greenfield investment and it is a wholly foreign-owned subsidiary. It is a relatively small MNE with 4 production facilities in 4 countries. It has globally around 5,000 employees, about 1,300 of which are employed in its one plant in Turkey. It operates in automotive supplier industry and exports more than 90% of its production. Since it does not have R&D unit and product development mandate in Turkey and the knowledge is mostly created in Italy and transferred to Turkey, we regarded it as an asset-exploiting subsidiary. In terms of quality and productivity, the production plant in Turkey is ranked first. Furthermore, local purchasing constitutes of 20-22% of their procurement turnover. As the procurement strategies are determined after its large customers' approval and their sales operations which manage the relations with these customers are in Italy, the company's autonomy level might be labeled as relatively low. Tanyu (2016) mentioned this issue during the interview:

As automotive industry has very high-quality standards, you cannot change your suppliers immediately. You should go through a very long approval process. For example, let's say you approved one new supplier. It is not enough. You should contact your customers, for instance, Volkswagen, to get their approval before starting to work with this supplier.

East Asian

East Asian was established with the equal partnership (50% - 50%) in 1999 and started production in 2000. YYY has around 100 production plants in about 40 countries and employs 83,641 people in these plants. In Turkey, East Asian employs around 1,000 people in their one facility. Therefore, this case provided us with very useful insights into the dynamics of sourcing strategies in JVs. Moreover, even though they have an R&D unit in Turkey, we labelled this subsidiary as an asset-exploiting one as the main mandate of the R&D unit is to adapt the product technology transferred from Korea to Turkish market. East Asian (2016) also clarified this issue in the interview:

Ours is more of an asset-exploiting subsidiary as all product projects, related technology and design are coming from Korea and there is mostly one-way knowledge flow from Korea to Turkey. As we inferred from the interview, the company, itself, might not be regarded as autonomous in its procurement activities.

³ <http://www.eldor.com.tr/content/en/Home.html>