Global Operations Sourcing Strategy: A Chinese Perspective

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We report on a field study of global manufacturing sourcing decisions that were made by multi-national companies operating in China. Based on responses from senior Chinese managers, the field study explored explicit sourcing and technology company decisions. The analysis provided insights into what these firms are doing with respect to global sourcing and why they are doing so. Analysis of the responses also shed light on how these decisions were made. Our results tested the validity of various arguments that have been put forward to predict or explain the pattern of global sourcing shifts that are taking place. The key takeaways from this study are 1) the observed pattern of decision making, which can be grouped into dominant flows, indicates that re-shoring to the developed economies is not happening on a large scale in our sample and that shifting in and out of and within China is occurring with direction and reasons dependent on the particular industry, and 2) insight into the fact that these firms are evaluating complex tradeoffs when making both technology and sourcing decisions and thus a single dominant driver, such as labor cost, does not adequately explain the observed patterns. Finally, the reported responses of Chinese managers in our field study did not indicate a move to re-shoring to the U.S. which has been reported in prior surveys for some industries and which also has been predicted by some industry analysts and political commentators.

1. Introduction:

The world today is in the midst of a period of upheaval and re-structuring of global supply chains that is leading to new sources for manufacturing and distribution for many firms. There is confusion, however, as to what is actually happening, why it is happening and the potential impact of these changes. There is anecdotal evidence which indicates that some firms are re- or near-shoring, while others continue to outsource and many have adopted new technologies. Indeed many firms are making multiple and sometimes off-setting adjustments[1]. Predictions

[1] In an informal review of corporate public announcements made in 2010-2013, we found 19 cases of off-shoring, 9 cases of near-shoring and 19 cases of re-shoring. We also found 4 cases of investment in robotics and automation.

have been made that U.S. domestic manufacturing industries will revive. Many theories to explain such expected changes have been suggested. Often these explanations are conflicting.

In addition to the strategic importance of sourcing at the firm level, there are significant policy issues that are impacted by the global supply chain decisions made by companies. Principal among them is the issue of employment. The sourcing of manufacturing leads to the transfer of jobs and wealth among countries. In the U.S., for example, there has been a major loss in manufacturing employment over the past 15 years, which some hope to see reversed through wide-spread re-shoring (see Figure 1). These issues have led to a wide range of incentives and restrictions, imposed by governments on companies that operate within their jurisdiction. These policies are targeted towards increasing the level of domestic manufacturing employment and can have a major impact on company sourcing decisions.

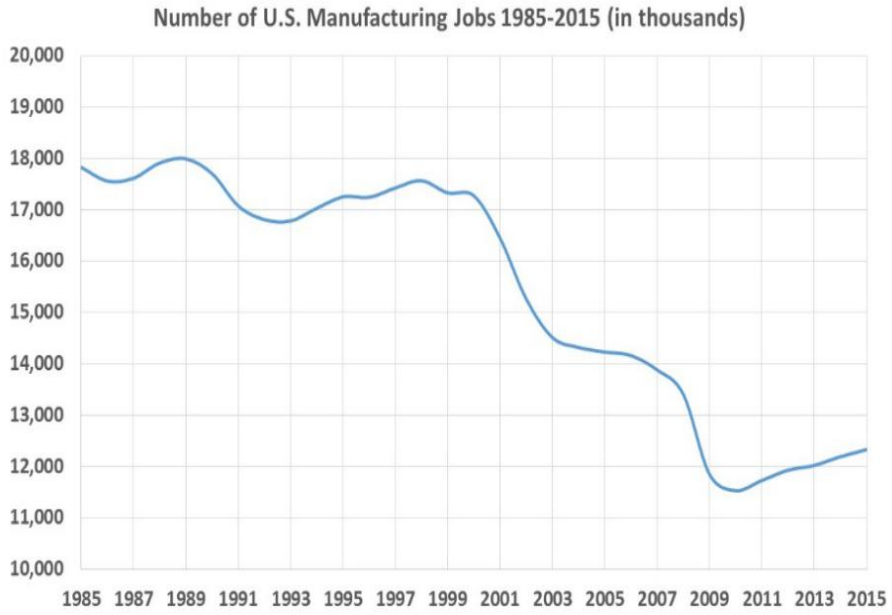

Figure 1: History of US Manufacturing Employment (Data Source: U.S. Bureau of Labor Statistics)

These observations motivated Simchi-Levi (2012) to launch a re-shoring survey to understand what U.S. manufacturers companies are doing about re-shoring, what factors are driving their decision process and to determine, if in fact, a geography shift is occurring. 156 US manufacturing companies, defined as having their headquarters in the U.S., responded to the online survey. The survey indicates some shift in manufacturing footprint. While 33.6% of respondents stated that they are "considering" bringing manufacturing back to the U.S., 15.3% of U.S. companies responded that they are "definitively" planning to re-shore to the U.S. In a

follow up survey, see Simchi-Levi (2014), data was collected from 89 U.S.-based companies and 33 non-U.S.-based companies. This survey reports very similar results. Finally, Simchi-Levi (2015) provides references to both surveys conducted by other organizations as well as analysis of the Purchasing Managers' Index (PMI), a monthly compiled index that shows changes in manufacturing activity. Again, the data indicates a move to near- or re-shoring.

These earlier studies, however, are based on responses from individual respondents representing their companies' intentions and plans. Such responses are subjective and may not be consistent with the actual strategies that companies are adopting in the context of global sourcing. Information based on responses from company employees also may be misleading because it does not necessarily correctly represent the intentions of the firm.

In order to understand the actual decisions concerning global supply chain sourcing and the technology strategy, we conducted a field study in China based on a multi-year-long effort that involved direct interaction with a wide range of companies. Survey respondents exclusively were senior managers and CEO's in Chinese divisions of multinational companies that operate in China (headquartered both domestically and abroad), who had a clear understanding of their firm's strategy.

The unit of analysis in the field study are the actual supply chain re-structuring decisions that companies have made or contemplated over the past three years. Specifically, each respondent provided information about all of the decisions (to off-shore, near-shore, re-shore or a combination of any of these) that his or her company made over the past three years for one specific product or product line. With this perspective, we were able to collect detailed and objective data about the kinds of decisions made for the product (line), the most significant drivers behind these choices, and the expected impact[2].

The goal of the study is to develop a thorough understanding of the actual decisions that are being made and the reasons behind these decisions. We believe that conducting a field study is arguably the best method for collecting and interpreting current company strategies given the inherent complexity of the underlying complexity of modifying a company's global supply chain strategy. As we shall see, based on the companies in our sample, the field study reveals a different perspective on the debate about re-shoring and near-shoring to markets in developed

[2] Company respondents were asked for expected impact instead of actual impact of decisions made, as companies may be less willing to provide information about company failures.

countries. The combination of our study's regional (Chinese) focus and the decision specific approach enabled us to develop insights, into the following questions:

a. What global sourcing decisions have been made or are being contemplated for these companies?
b. Why are these decisions being made; i.e. what are the drivers of these decisions?

Analysis of our data also shed light on how the firms in our study are making the strategic choices associated with global sourcing and technology investment. The principal findings of the study as it relates to what these companies are doing include the following observations:

1) Manufacturing continues to shift away from developed economies for firms in our study. In particular, Europe (EU 15) and North America are losing ground.
2) China is the biggest market as well as the biggest source for manufacturing in the world in our study, and is attracting more companies who are moving into it for access to its growing market.
3) China is attracting more complex products (e.g. Equipment and Machinery, and Automotive supplier industries) and is using more automation, while at the same time, China is giving up simpler, more standardized, labor intensive products (e.g. Apparel). As a result, the net change of the number of manufacturing jobs in China, observed in our sample, surprisingly is negative.
4) There is a net production increase in Central & South America and in East Europe & Russia in our study.
5) The movement of manufacturing within China is happening selectively, i.e. only a subset of our sample reported movement of production from coastal to inland China.
6) Manufacturing jobs are not coming back to the U.S. for companies who participated our field study which is in contrast to the observations reported in the earlier surveys by Simchi Levi (2012, 2014) and in a follow-up, ongoing survey we are conducting with the same survey instrument in Cohen et al (2015). Such jobs, however, remain in ASEAN countries (for labor-intensive, simple products) or in China (for more complex products). We also note that the follow-up study indicated that the jobs that are returning to the U.S. are due to decisions by non-U.S. companies.

Analysis of the pattern of responses to understand how and why these decisions were being made indicated the following:

1) Consistent with anecdotal evidence, firms in our study are re-structuring their supply chains by making a wide range of sourcing and technology investment decisions.
2) Multiple and often conflicting reasons are given for making these changes which indicates that a comprehensive tradeoff and risk analysis is being carried out by these firms and that low labor cost is no longer the major reason for shifting production. In particular quality, market access and risk have emerged as important drivers.
3) Priorities on decision drivers were highly dependent on the specific choices, i.e. companies that shifted manufacturing from the EU to China in our study indicated that labor costs, logistic costs and market access were the top 3 reasons for making this change, while companies that are shifting product out of China to other ASEAN countries stated that the top three drivers were labor costs, supply availability and product quality.
4) The pattern of sourcing changes that emerged is quite complex with significant variation observed by industry and by origin and destination of the production volume flow.

Overall, the decision specific observations collected in our field study are consistent with our expectation that companies are solving the sourcing and technology choice puzzle in a manner which incorporates a wide range of global options, multiple tradeoffs and multiple resource and policy constraints. It is important to note that while the sample covers a wide range of industries, it is small and not random. Thus we do not attempt to develop generalizeable conclusions concerning the causality of global supply chain re-structuring. As we shall see, however, our findings are very consistent with recent studies reported in various industry studies, (including a follow on study of a different sample that was based on our survey instrument – see Cohen et al (2016)). We do believe that our unique data set, derived from actual company decisions, provides insights that are relevant to the ongoing debate about manufacturing sourcing. We also note that drawing insight from observed manager decisions has long history in the Operations Management field. (see Bowman (1963) and Cohen et al (2003)), and the field study methodology that we used here could be applicable to other empirical studies of complex operations strategy issues.

The rest of the paper is organized as follows. Section 2 describes the field study design and methodology which is based on sourcing and technology decisions as the unit of analysis. Section 3 contains a review of the relevant literature on supply chain sourcing and strategy. Section 4 describes the sample and results at a firm / regional level and includes a discussion of

current locations for manufacturing and markets. It also reviews two specific industry sub-samples to illustrate how industry results can differ from those generated at the firm level. Section 5 discusses the reported decisions to either increase or decrease production and identifies the major flow patterns that vary by source and destination. Section 6 then provides a more detailed analysis of the top 3 flow patterns and illustrates how results on drivers can vary significantly by flow. Section 7 describes results broken down by industry. Section 8 focuses on the observed internal flows within China and illustrates how our methodology can be applied to this particular geography. Section 9 reviews the results on technology investments and the impact on job creation. Conclusions are presented in Section 10.

2. Methodology and Survey Design:

To the best of our knowledge, our survey is the first study to adopt a *decision* focus within the context of a supply chain network model for global sourcing and investment. In particular we observe that global supply chains consist of a network of value adding facilities, connected by material, information, financial and decision flows. The study asks companies to indicate if they have made any decisions for a specific product (in the past three years), to increase or decrease its volume of production sourced from a specific geography at the particular stage within the value adding process that they are operating at. Responses can be summarized in terms of the net shift of manufacturing of this product from one region to another. Framed in this way, we include decisions to re-shore, near-shore or off-shore on a global basis. We also asked firms to indicate if they have increased investment in automation and R&D for the same surveyed product. To conduct our analysis, we collected data at both the firm level and at the decision level.

The goal of a firm operating a global supply chain network, where the material, information and financial flows cross country borders, is to match supply with demand on a global scale. A typical objective could be to maximize global, after-tax profit or alternatively to maximize growth, market share or return on investment, (see Cohen and Lee (1989) for an example of a normative model formulation). Achieving such a goal involves a hierarchy of decisions that determine material flows, capacity and capabilities at each value-adding location. The cash flows and capital investments derived from these decisions determine the landed cost for every product/customer destination combination and impact the total cost of ownership to the customer

for each product over its period of ownership and use. These costs ultimately drive market share and competitive performance for the firm.

The principal tradeoffs associated with the management of a global supply chain network include all fixed and variable costs, as well as revenues that drive global after-tax profit, along with metrics related to customer satisfaction, service and competitive position. There are multiple resource constraints based on capacity and capabilities of all value-adding processes, at all stages in the product life cycle (i.e. design, produce, fulfill, support) along with financial, trade and content restrictions imposed by each country where the firm operates as either a producer or distributor of products. Finally, there are significant risks (i.e. foreign exchange, markets, prices, suppliers, competitors, etc.) that are associated with the management of global supply chains. Indeed a primary goal of supply chain strategy is to mitigate such risks.

There is an extensive literature on modeling of global supply chains that optimizes capacity, location and technology choices that considers the factors noted above, (see Kouvelis and Su (2005) for a comprehensive survey of this literature). Based on this normative model perspective, we identified a wide range of possible drivers for re-structuring decisions that is based on tradeoffs, risks, incentives, constraints and environment factors. In particular we identified factors such as labor, transportation, material and overhead costs; market, supply and foreign exchange risk; technology; government policies; flexibility; and lead times.

Figure 2 illustrates the overall structure of the survey instrument used in the field study. We collected data both at the firm level and at the decision level which is associated with the specific supply chain decision(s) that have been made or are being contemplated. The decision level data includes characterization of the nature of the decisions that the response was based on, i.e. locations and magnitude of capacity shifts, new technology investment, etc. We also collected data on a wide range of attributes associated with the products and processes associated with the particular decision(s). Finally, the survey gathered information concerning the firm's current

supply chain structure and its competitive environment.

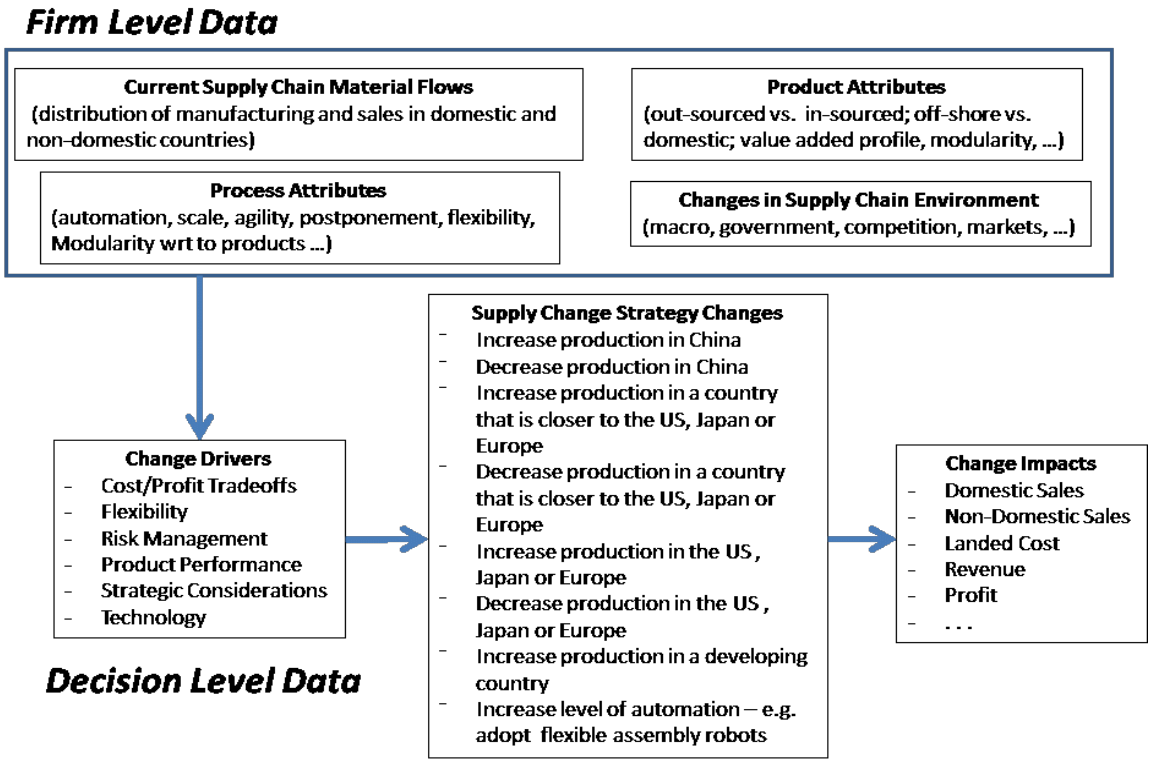

Figure 2: Survey Instrument

Our decision to adopt a decision focus in the study was based on the following observations:

1) While firms may espouse a coherent global sourcing strategy, in fact the observed pattern of material flows, production volumes and capacity investments cuts across internal organizational boundaries and impacts multiple regional and country specific markets. As a result it is difficult to ask the question of "where are you sourcing" at the firm level. The actual sourcing policy is defined by a collection of decisions to locate and utilize sourcing options that are made by the firm for particular products and markets, e.g., Apple has re-shored some of its Mac production to the U.S., but keeps all iPhone assembly in China.
2) Global sourcing decisions are very complex and impact all facets of the company. They also have major, long-lasting strategic impacts. Thus it is typical for a business case analysis to be conducted to evaluate sourcing and strategy options based on predictions of their impact. This suggests that both drivers and expected results can be attributed to the decisions that have been made or that have been contemplated.

Our normative and decision specific perspective for evaluating the design and operations of a global supply chain gives rise to a wide range of possible drivers for the reported re-structuring decisions, that include tradeoffs, risks, incentives, constraints and environment factors. In particular we identified the following 22 possible decision drivers listed in Table 1.

Respondents were asked to rank each possible driver, on a 1 to 5 scale in terms of its impact on the particular global supply chain sourcing decision that the firm made. We note that drivers 1) through 5) correspond to different costs, drivers 6) through 13) relate to the firm's supply chain capabilities and drivers 14) through 22) can be associated with the competitive environment.

1) Labor costs	12) Time to launch a new product or re-design an existing product
2) Logistic costs, including inventory and transportation costs	13) Innovation and design capability
3) Raw material costs	14) Market changes, including growing or emerging markets and level of competition in the market, customer wishes etc.
4) Fixed costs, including costs associated with building factories, setting up production lines, and setting up robotic arms, etc.	15) Currency and foreign exchange rate volatility
5) Energy costs	16) Public infrastructure
6) Supply availability, including material resources, supplier base, etc.	17) Government incentives, including financial subsidies, tax and duty policies, free trade, local content requirements etc.
7) Quality and availability of labor inputs	18) Government regulations, including labor laws, environmental laws, local content requirements, WTO agreements, foreign currency control, etc.
8) Delivery lead-time, i.e. the time between order placement and product delivery	19) Intellectual property protection and risk
9) Supply chain flexibility, including flexibility of process to changes in product mix and scale	20) Automation and technology advances of the production process
10) Product quality, including product reliability and brand image, etc.	21) Management complexity with respect to people, information, processes, etc.
11) After sale service and support quality	22) Environmental sustainability

Table 1: Decision Drivers

Prior to administering the field study, we collected 40 cases of public announcements concerning changes in manufacturing location by well-known multinational companies. We then analyzed the main driving factors that were reported to have influenced the company production shifts. The results are listed in Table A in the appendix. We note that, 32.5% of the companies took labor costs into account. The second important factor was proximity to markets, which also

was mentioned by for 32.5% of the companies. The third most mentioned factor was government incentives which occurred in 30% of the announcements. Finally the provision of service support is also an important driver, present in 17.5 % of the cases.

45% of the companies reported an increase of production in the U.S. and the key drivers they mentioned were political incentives to increase employment and the cost of labor and transportation. All the companies that increased production in China considered the drivers of being close to the growing market in China, reducing logistics costs and facilitating the provision of support services. Companies that increased production in Southeast Asia and India, did so primarily because of labor cost. For example, Canon is no longer building or expanding factories in China, but is doubling its work force at a printer factory in Vietnam.

Several hypotheses are can be derived from these reports:

H1. Companies are shifting their production to China in order to gain access to the Chinese market.

H2. Companies are shifting their production to the U.S. due to government incentives.

H3. Companies are shifting their production to ASEAN because of labor cost.

H4. In general, labor cost, market proximity, and government incentives are the most important drivers for global supply chain sourcing decisions.

We note here that these hypotheses are also consistent with some of the more general findings that have been reported in the literature, which are discussed in the following section.

3. Literature Review:

There are multiple and extensive literatures that are relevant to global sourcing and global supply chain strategy that have considered the problem at a firm, industry or country level. Given the decision based perspective used in our survey, we will restrict our discussion here to a number of articles in order to provide a conceptual context for the normative modelling and empirical analysis of the question of where and how firms should source manufacturing.

Alfred Weber's work (1909) established the foundations of modern location theory, which deals with transportation and production costs (Badri, 2007). Product life-cycle theory, initiated by Vernon (1966), was first to explain the location of manufacturing globally. The theory suggests that as products mature both the location of sales and the optimal production location will change affecting the flow and direction of trade. The production location will move from

the innovation country first to advanced countries and last to developing countries as products and market grow mature.

Krugman (1993) compared global manufacturing location and trade theories, concluding the two are quite similar because they ask the same basic question, i.e. who produces what goods in which locations. For example, the classical Heckscher and Ohlin model of comparative advantage in international trade theory, predicts that countries will produce and export goods that make intensive use of those factors that are locally abundant, while importing goods that make intensive use of factors that are locally scarce (Krugman and Obstfeld, 2006). Empirically, Rosen (2003) showed that China has comparative advantages over Mexico in the industries of leather, manmade woven fabric, office machines, computer equipment, electrical transmission equipment, motorcycles, and furniture.

Another closely related theory is FDI (foreign direct investment) theory, because a global location decision may lead the company make an FDI, such as open a subsidiary factory. For example, the famous eclectic paradigm of FDI theory (Dunning, 1988), analyzes international production relative to an OIL framework that includes Ownership, Internalization and Location Advantages. Empirical studies of OIL have suggested that market size, market growth, barriers to trade, production and transportation costs, political stability and regulations can be related to location decisions (Dunning, 1995). Sethi et al. (2003) developed a regression model and found that low wage rates and the liberalization of Asian economies were important factors for US-based international enterprises' FDI flow from Western Europe to Asia. Cantwell (2009) discussed the theory development of this field.

As Gray et al. (2013) stated, the re-shoring problem is a reversion of a prior offshoring decision, so the location decision is also related to the studies of manufacturing offshoring, which is the transfer of production, supply, and R&D activities from home grown to foreign locations. As stated by Davis and Naghavi (2011), "Off-shoring is seen chiefly as a cost-saving strategy for firms, who at times see it as their only means of survival". Firms have used offshoring to reduce non-tradable production costs, particularly labor cost (Maskell etal.2007). Swenson (2004) uses data from the US Overseas Assembly Program and demonstrates country costs and sunk costs (such as entry costs) are factors in the offshore decision.

Vestring et al. (2005) suggested that "every country presents a different mix of strengths and weaknesses", and they identify several factors to decide where to offshore, include operating

costs, regulatory environment, domestic markets, engineering talent, political stability, currency fluctuations, facility costs, infrastructure, and language skills. Firms may offshore to access knowledge or talent that may be difficult to find in the home country (Manning et al., 2008 and Berry and Kaul, 2015). Mann (2012) shows the important role of government trade-facilitation policies to attract locations for manufacturing.

Ellram (2013) describes the results of a survey that addresses questions of offshoring and reshoring to the U.S. Using a factor analysis, this survey identified product attributes, costs, labor, logistics, disruption risk, strategic access, country risk and government trade as drivers of location choice. Their results also indicated the increasing importance of supply chain factors in making location decisions, which is consistent with our observations. Da Silveira (2014) analyzes data from the fifth International Manufacturing Strategy Survey and indicates that design and supply offshoring effort is positively associated with the competitive importance of cost and on flexibility, but not delivery. We note that these surveys were conducted at a firm level and thus are based on a more aggregate perspective compared to our decision focus.

As noted earlier, there is an extensive literature on normative modeling of the global supply chain design problem, (which includes plant location and product sourcing) reviewed in Kouvelis and Su (2005). A more recent discussion of this literature and a formulation of the general problem can be found in Cohen and Cui (2015).

Recently a number of competing theories have been put forward to explain and to predict how firms should make global sourcing strategy decisions. Table 2 presents a summary of these theories in terms of their basic rationale and expected impact.

Sourcing Theory	Rationale	Expected Impact
Landed Cost Serkin et al (2012)	Landed cost = fully loaded cost of producing and delivering a product to a specific end market Landed cost is a function of global supply chain strategy (sourcing of inputs, production & assembly, distribution)	When landed cost advantage falls below a critical level, (i.e. the tipping point), manufacturers will re-shore to the US. China's advantage is diminishing due to the faster increase in labor costs in China. Availability of low cost energy in developed countries is affecting landed cost in energy intensive industries.
Cost of	Add cost of maintenance, after-sales	As relative value of service over customer

Ownership Cohen et al (2006)	support and disposal to the landed cost. Affected by service support strategy, warranties and product reliability.	product life cycle increases, this cost will become more important. The delivery of service to customers may be more difficult under off-shore manufacturing.
Real Options Arnd Huchzermeier and M. A. Cohen, (1996) Kouvelis and Su (2007)	Investment in production and sourcing capacity in different countries is equivalent to the purchase of a real option. Sourcing, product mix and distribution decisions made in response to random contingencies (i.e. market demand, costs, foreign exchange, government regulation, etc.), is equivalent to the exercise of the option. The cost of acquiring the flexibility to enable switching sourcing locations is the cost of purchasing the option.	A combination of financial options and real options is required to mitigate the risks faced in a global supply chain.
Product Development and Innovation Pisano and Shih (2012)	The "Industrial Commons" is the set of common resources associated with production, R&D and support which are co-located at a particular location and which together support all firms at that location in being more productive and innovative (i.e. provides access to labor, suppliers, knowledge, etc.). All companies share the benefits and support the maintenance of the commons but none own it. Outsourcing by a firm to a different location diminishes the capability of the commons and affects all of the companies. This is especially relevant for industries where there is low level of "modularity" between manufacturing and development and where production processes are less mature	Outsourcing of manufacturing leads to loss of capability to develop new products & adopt new technologies

Information Technology and Automation Brynjolfsson and McAfee (2012)	It is possible to replace direct labor for assembly with flexible automation and robots. Availability of massive data and connectivity has altered the potential for global coordination. Job opportunities for those with appropriate education and training are abundant.	Developments in information technology are driving sourcing decisions and make the impact of a labor cost advantage less important in making sourcing decisions.
Government Policy Decisions Roxburgh et al (2012)	Governments have the objective of maximizing the welfare of their citizens and wish to promote the availability of higher paid employment. Governments influence global supply chain strategy by impacting a firm's global, after-tax profit. The mechanisms available to government include tax rates and incentives, local content rules, import quotas, capital movement regulations, investment credits and investment funding, political pressure, etc.	Companies operating globally must conform to government policy requirements in every country in which they operate.
Supply Chain Risk and Disruption M. S. Sodhi, C. S Tang (2012)	A firm's capability to respond to supply chain disruptions (due to disasters, accidents or competitive actions) often require the development of new supply sources and investment in options to increase overall flexibility of the global supply chain.	The ability of a firm to mitigate supply chain disruptions is affected by a firm's global supply chain structure and capabilities and its sourcing strategy.
Developing Economies Deloitte et al (2013)	Majority of market growth is occurring in developing countries. These countries will be a major source of labor as demographic pressures continue in developed countries.	Localization of manufacturing in developing economies provides better access to these growing markets and must be included in a firm's supply chain sourcing strategy.

Table 2: Competing Theories to Explain Global Supply Chain Sourcing

4. Sample:

The field study was administered with the collaboration of the faculty at Shanghai Jiao Tong University and the Shanghai University of International Business and Economics. A one-day forum was held in June of 2013 on the campus of Shanghai Jiao Tong University. Over sixty senior executives from different companies in different industries participated in the forum. Two members of the research team presented their studies in global supply chain strategy and introduced our field study. Senior executives of three companies shared their practices of global sourcing and perspectives of the future trend respectively. The forum was concluded with a panel discussion, when all participants exchanged ideas about the changes of global sourcing strategy, their understanding of the underlying drivers and the related managerial challenges. The goals were to interact with senior executives from leading multi-national companies headquartered or operating in China, to build personal connection and to refine the survey for our field study.

After the forum, we designed the survey and carried out field study subsequently. As noted the unit of analysis in the study are the actual supply chain re-structuring decisions that companies have made or contemplated over the past three years. As a result, our target sample was small and there could be significant correlations across all categories of the data that was collected. Moreover, many of the attributes of products and processes are endogenous. Thus identification of causal factors for the sourcing decisions of interest will be challenging, however it was also not the goal of this field study. Our goal as noted, was to develop a comprehensive picture of the decisions concerning global supply chain sourcing that are being made with the companies in our study and the reasons for those decisions.

To ensure that the data reflected actual decisions of the firms as opposed to their intensions, we targeted a set of top Chinese managers who were the decision makers or on the decision-making team of their companies, and administered a survey to each of them either by mail or on-line. Data was later checked for consistency and accuracy through follow-up discussions with each respondent and in many cases the data was provided from multiple sources within each company. For example, one respondent (the executive director of a company) told us she had to coordinate a meeting with directors of three different departments to gather information before answering our survey.

Respondents reported that it generally took them one hour to complete the survey after the required information had been assembled from multiple company sources. The data collected not

only allowed us to conduct a descriptive study, but also to perform some basic statistical analysis. As the complexity and consequences of supply strategy decisions are significant. It is important to note that it was necessary for respondents to have an appropriate level of authority and understanding of their company's supply chain strategy in order for them to acquire the essential data needed to respond. As a result, we were able to assemble a unique data set that provides detailed insight into the changing strategies of companies operating in China.[3]

We approached 80 companies and received a total of 49 companies responded to this field study. While the sample we obtained was not random, we believe that it is appropriate for a field study that is directed towards providing a comprehensive picture of current global sourcing strategies used by these companies in China. The 49 companies came from 8 industries, and they typically were multi-nationals with diverse global headquarter locations (see Figure 3). Yearly sales revenue of these companies ranged from 3.3 Million to 100 Billion USD. As a consequence most of the data is presented in terms of percentages of the sample and where relevant for industry groupings whose definitions were broad enough to maintain confidentiality. We also note that many companies reported multiple relocation and sourcing decisions and as a result we observed a total of 89 sourcing "flows". We will elaborate on the definition of such flows in our discussion below.

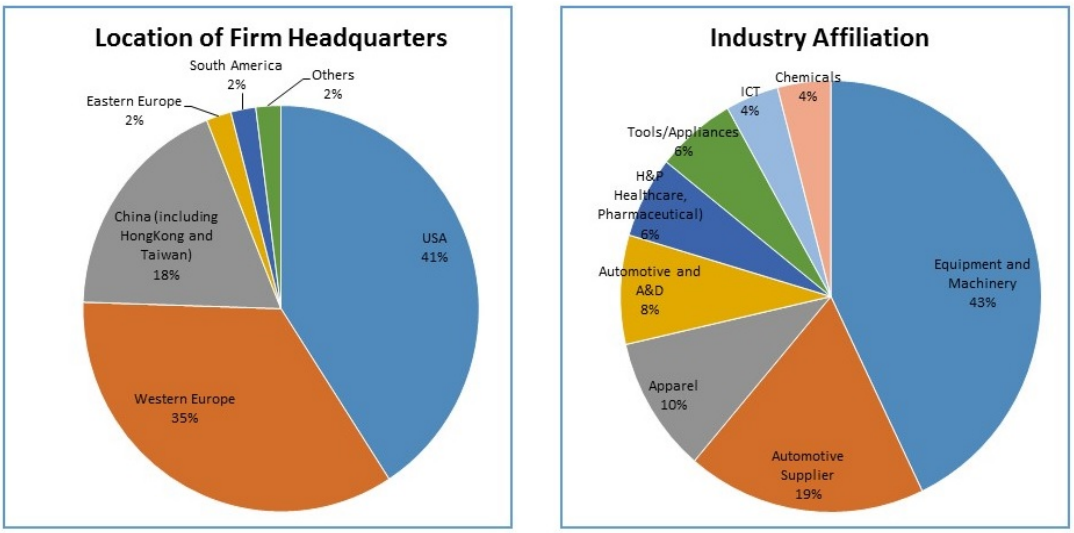

Figure 3: Survey Sample Composition

[3] A condition for participation in the field study was a guarantee of confidentiality and anonymity with respect to any reporting of results, i.e. it will not be possible to determine the identity of a specific company based on the reported results.

5. Balance of Trade for Production:

A further insight provided by the firm level data in our study is concerned with the balance of trade for manufacturing. Figure 4 illustrates the distribution of assembly locations and sales revenue for the participating firms. It is not surprising to observe that for our sample, China, which is the largest source for final product assembly with the largest market, is also the largest exporter with a net positive trade balance (production – sales). North America (U.S. & Canada), which is the largest importer, along with Europe (EU-15) and Japan, however, have a net deficit with respect to production. These results are consistent with statistics from the Chinese Bureau of Statistics.

It is interesting to examine the balance trade when we break down these aggregate results by industry. We illustrate the specific cases of the Apparel and the Automotive plus the Aerospace and Defense industry segments in Figure 5. The trade surplus, as expected, is significant for both China and other Asian countries in the Apparel industry. There is much more balance however in the Automotive plus the Aerospace and Defense industry segment, which indicates that a more localized approach for manufacturing is being adopted in this segment.

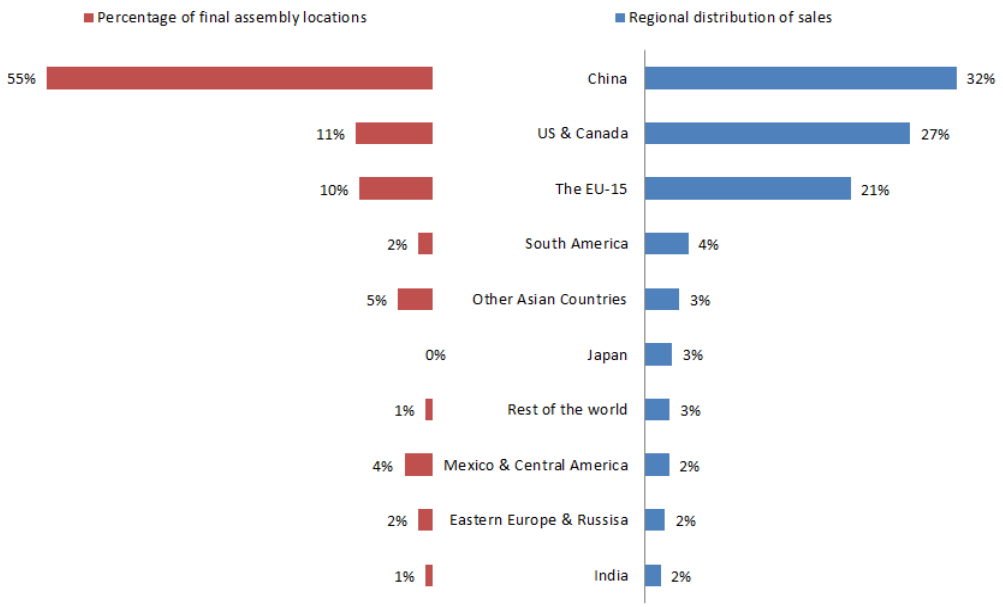

Figure 4: Balance of Trade for Production

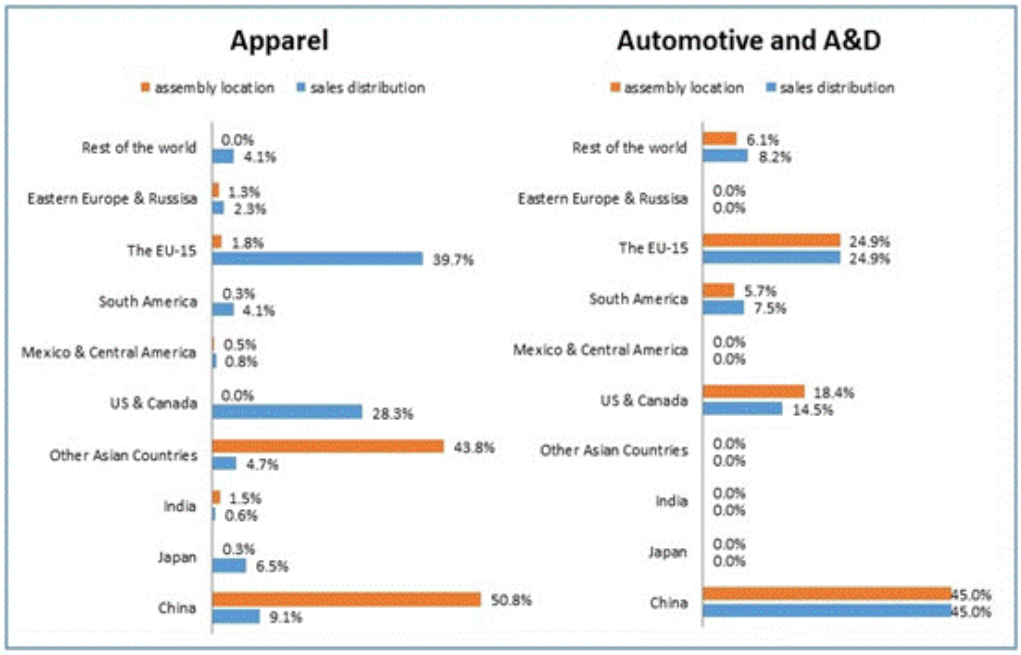

Figure 5: Balance of Trade for Production for Two Industries

48 of the 49 companies who completed our survey listed one product where one or more changes to that product's global supply chain manufacturing sourcing strategy had been considered and/or implemented in the last three years. Only one company answered that no changes were made, because their product was still in its test period.

Many of the surveyed companies reported multiple sourcing and capacity adjustments that occurred within various geographies. In particular, we asked companies where they increased or decreased manufacturing volume (see Figure 6). 75.5% of the companies in our study reported increased production in China and 18.4% reported increased production in ASEAN countries for the past three years. Decreased production occurred in the EU-115 (32.7%) and North America (20.4%). We observed, however that both increases and decreases occurred in many of the geographies.

Figure 6: Recent Changes in Production Volume by Percentage of Companies by Region

These data suggest that in our sample China will continue to be the largest source for manufacturing since it is at the highest level currently and is experiencing the highest level of growth. As noted earlier, as reported in earlier surveys and as stated by some business analysts and political leaders, the shift of manufacturing back to the U.S., Japan, Europe and/or other developed countries is a real and growing phenomenon which could revive domestic manufacturing and service industries. Our survey responses do not support this statement for our sample, (e.g. North America's net growth is +12.2% - 20.4% = - 8.2% and EU has a net growth of +2% - 32.7% = – 30.5%). Indeed the trend in U.S., Europe and Japan is still dominated by the strategy to reduce domestic manufacturing. This is consistent with recent anecdotal evidence concerning the difficulty firms are encountering when they attempt to re-shore manufacturing to the U.S. (see Shih (2014) for a discussion of the experience of GE Appliances in this regard).

As we shall see, it is necessary however to explore changes in sourcing at a more detailed level and in a manner which captures the geographical dispersion of sourcing locations.

6. Pattern of Change:

Our analysis of the responses was based on observed "flow" patterns that captured the net adjustments made with respect to specific sources and destinations, which are displayed in Figure 7. Note that the top three patterns include i) 33% of the companies in our sample had

flows from the EU to China, ii) 20% went from North America to China, and iii) 10% went from China to ASEAN countries.

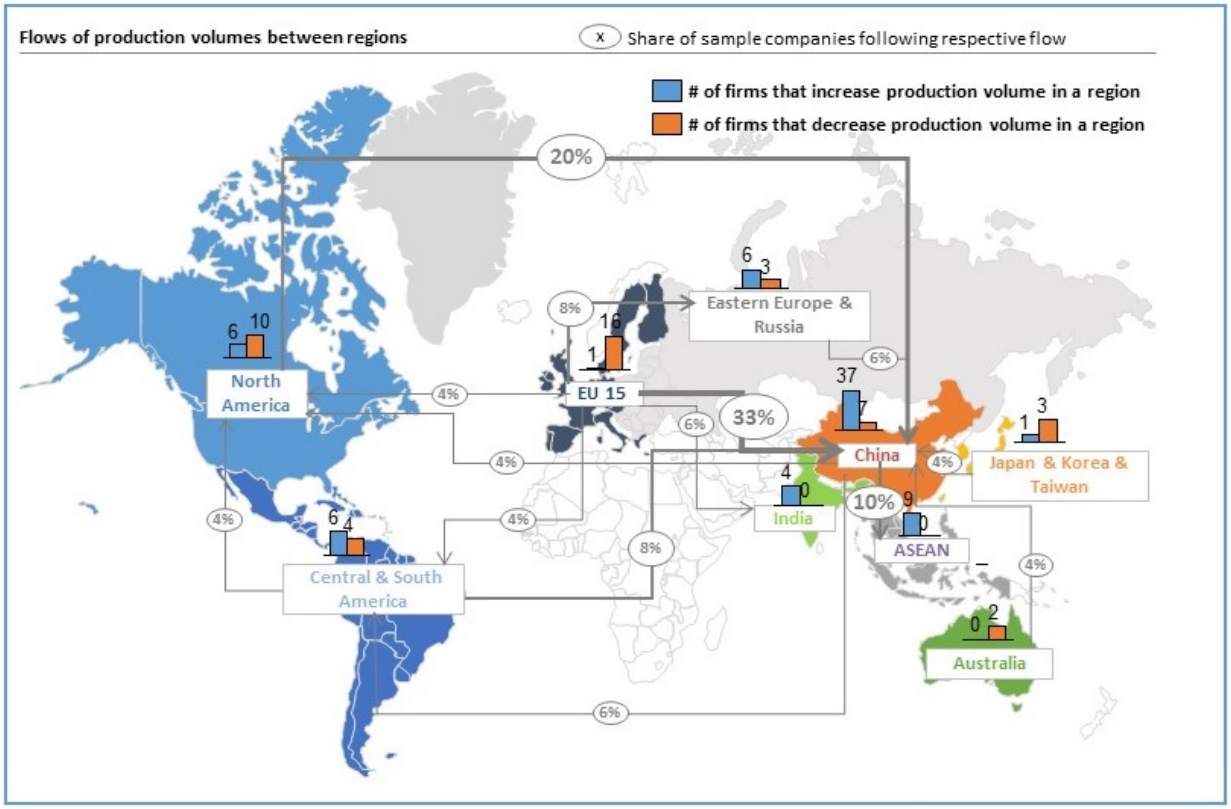

Figure 7: The Dominant Flows for Shifting Sourcing

The focus of our analysis is to identify relationships between these flow decisions and possible drivers along with other firm level factors. We discovered, in particular, that the top drivers varied significantly by flow. Table 3 illustrates the top 10 drivers for the three flows that were reported with the highest frequency, i.e. from EU15 to China, from North America to China and from China to the ASEAN countries. For example, the companies who shifted from EU15 to China in our study rated labor costs, logistics costs, market changes and supply availability as top drivers.

From EU15 to China	From North America to China	From China to ASEAN
Labor costs	Labor costs	Labor costs (T-1st)
Logistic costs (T-2nd)	Raw material costs (T-2nd)	Supply availability (T-1st)
Market changes (T-2nd)	Market changes (T-2nd)	Product quality (T-1st)
Supply availability	Logistic costs	Innovation and design capability (T-1st)

Raw material costs (T-5th)	Product quality	Currency and foreign exchange rate volatility (T-1st)
Supply chain flexibility (T-5th)	Delivery Lead time (T-6th)	Logistic costs (T-6th)
Delivery Lead time (T-7th)	Government incentives (T-6th)	Raw material costs (T-6th)
Government incentives (T-7th)	Supply availability (T-8th)	Quality and availability of labor inputs (T-8th)
Fixed costs	Intellectual property protection and risk (T-8th)	Supply chain flexibility (T-8th)
Quality and availability of labor inputs	Fixed costs/Quality and availability of labor inputs (T-10th)	Government incentives (T-8th)

Table 3: Top 10 Drivers for the Three Major Flows

It is interesting to note that labor costs which are the most important reason for companies expanding production in China from either the EU15 or North America is also the top driver for companies that are moving away from China to the ASEAN countries. This can be understood if we look at differences at a more detailed level.

For example, 16 companies reported that they had moved at least some production from EU15 to China. Interestingly, this move is also correlated with less labor-intensive products compared to the others (p=.088). This movement also has a significant positive correlation with their decision to increase the level of automation, e.g., adopt flexible assembly robots in their production (p=.005). Indeed, 13 of the 16 companies reported they increased their level of automation which suggests that automation is being used to replace labor.

More Apparel companies (p=.020) and less Equipment and Machinery companies chose the strategy of moving from China to ASEAN (p=.042) compared to the industry composition in other flows. (See Figure 8 for an industry breakdown for the top 3 flows.) This movement is strongly correlated with a more labor-intensive product (p=.003), a more standard product (p=.059), lower unit cost (p=.080), and proximity to the end consumers (p=.096). This seems to be aligned with the story documented in "Travels of a T- Shirt in the Global Economy" by Rivoli (2014). As labor wages continue to increase at a much higher rate in China, ASEAN becomes the next destination for cheap labor.

Also note from Table 3 that Market Change is one of the top 3 drivers for companies in our study moving to China, but is not in the top 10 for companies moving away from China. This suggests that China, which is the biggest market in our sample, is attracting production due to the growth of its market. Industries that are moving from China to ASEAN are more export oriented, (i.e. Apparel), and thus factors such as product quality, supply availability, innovation

and design capability and currency fluctuations, all or which determine a product's value in global markets, are important.

Thus when a product is less labor intensive and uses more automation, labor cost differences can be the top driver for moving manufacturing to China (as opposed to moving to countries with even lower labor costs such as ASEAN) to supply the local growing market. It is not surprising, that, compared to others, the companies moving from EU15 to China expect significantly more Chinese Sales of the product (p=.002) and less U.S. sales (p=.031). When the product is more labor intensive, then differences in labor costs can be the most important driver for moving away from China to ASEAN. These companies also expect significantly less China sales (p=.017) by moving out of China.

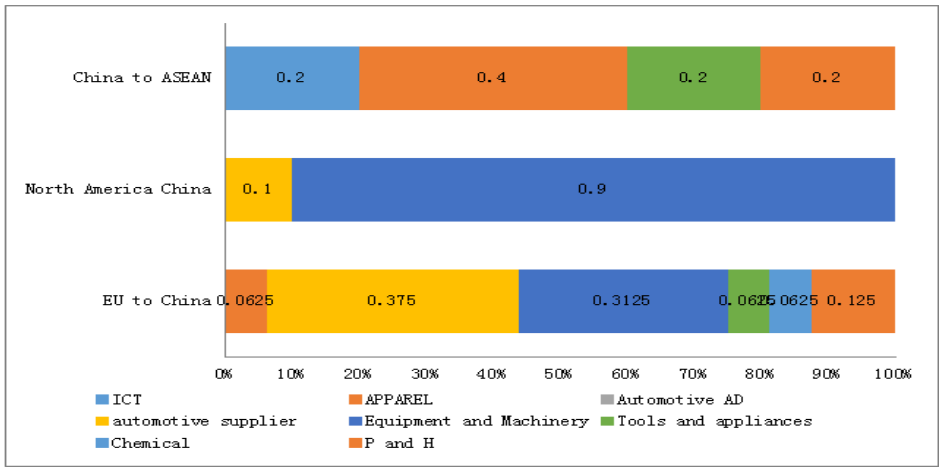

Figure 8: Industry Composition for the major movements

10 companies reported they moved their production from North America to China, and all of them are headquartered in the U.S. 9 of them are in the Equipment & Machinery industry. Again Figure 8 shows the industry decomposition of the three major flows. The overall industry composition suggests that China is attracting more complex products (e.g. Equipment and Machinery and Automotive supplier) and is giving up simpler, more standardized, labor intensive products (e.g. Apparel). These companies also expect significant less U.S. sales (p=.037) and lower selling price of the product (p=.003) by moving production from the U.S. to China, compared to companies not moving from North America to China.

7. Industry Analysis:

We can break down analysis of our observations by industries in a manner similar to what we conducted in the previous section. We will focus on the 4 major industries observed within our sample. Table 4 lists the top 10 drivers, in rank order, for each of these industries in our sample.

Equipment and Machinery	**Automotive Supplier**	**Apparel**	**Automotive OEMs & A&D**
Labor costs	Market changes	Labor costs (T-1st)	Supply availability (T-1st)
Raw material costs	Labor costs	Product quality (T-1st)	Market changes (T-1st)
Market changes (T-3rd)	Environmental sustainability	Innovation and design capability (T-1st)	Government incentives (T-1st)
Product quality (T-3rd)	Delivery Lead-time	Supply availability (T-4th)	Quality and availability of labor inputs (T-4nd)
Innovation and design capability	Logistic costs	Quality and availability of labor inputs (T-4th)	Product quality (T-4nd)
Delivery Lead-time	Management complexity (T-6th)	Currency and F/X rate volatility (T-4th)	Innovation and design capability
Logistic costs	Fixed costs (T-6th)	Government incentives (T-4th)	Raw material costs (T-7th)
Supply chain flexibility	Quality and availability of labor inputs (T-6th)	Supply chain flexibility (T-8th)	After-sale service and support quality (T-7th)
Government incentives	Supply chain flexibility (T-6th)	Time to market for new product introduction and product re-design (T-8th)	Time to market for new product introduction and product redesign (T-7th)
Fixed costs	Auto. and technology advances of the mfg. process (T-10th)	Delivery Lead-time (T-10th)	Government regulations (T-7th)
	Raw material costs (T-10th)	Market changes (T-10th)	Intellectual property protection and risk (T-7th)
	Product quality (T-10th)	Government regulations (T-10th)	Auto. and technology advances of the mfg. process (T-10th)
Table 4: Top 10 Drivers for the Four Industries			Management complexity (T-7th)

It is interesting to note that labor costs are ranked first or second for the Equipment and Machinery, Automotive Supplier and Apparel industries, but was not in the top ten for the Automotive OEM & Aerospace and Defense industry. Market changes, on the other hand, were

highly ranked for all of the industries, except for Apparel which as noted earlier, competes on a more global basis. Government incentives were noted in three of the four industries, but in the Automotive OEM & Aerospace and Defense industry it was tied for first place.

In the remainder of this section we consider the impact of product and industry attributes on the sourcing decisions.

7.1 Equipment and Machinery

Compared to the other industries, companies from the Equipment and Machinery industry reported higher ranking of their company size within the industry (p=.025). Their products are rated at a higher unit cost (p=.039) and enjoy a higher profit margin (p=.007).

We observed that this industry is decreasing production in North America (p=.000) and East Europe & Russia (p=.040), because they are moving from North America to China (p=.000) and East Europe & Russia to China (p=.040). We note that these companies, however, are not moving from China to ASEAN (p=.042). As a result of the reported strategy changes/decisions, the companies in this industry expect significant lower average total cost (p=.034) and selling price (p=.014) per unit. Compared to the other industries, these companies also view Government regulations (p=.062) and Currency and foreign exchange rate volatility (p=.078) less important. Surprisingly, they are not increasing their level of automation (p=.072).

7.2 Automotive Supplier

The automotive supplier industry has the highest level of customization (p=.065). They produce parts according to orders received from the automotive OEM industry sector. The products produced by respondents in this industry are rated at a lower profit margin (p=.003).

The companies in this industry reported that they are decreasing their production in EU15 (p=0.015) and increasing production in East Europe & Russia (p=0.033) and in the coastal area of China (p=0.046). They also are moving from EU15 to China. As a result of these strategy changes/decisions, these companies expect significantly more China sales of their products (p=.043). Finally, they are increasing the level of automation (p=.017) and R&D investment (p=.001) and they view Environmental sustainability more important (p=.058) compared to the other industries.

7.3 Apparel

For the apparel industry, their products are rated at a higher level of labor intensity (p=.001) and standardization (p=.059). They also rated at a lower level of modularity (p=.014) with a lower unit cost (p=.080)

Companies in our sample from this industry are increasing production in ASEAN countries (p=0.000), decreasing it in China (p=.086), and as a result that they are moving from China to ASEAN (p=.020). They are not increasing their level of automation (p=.011) or R&D investment (p=.079), as was observed in the apparel industry. Compared to the others, these companies also viewed currency and foreign exchange rate volatility to be more important (p=.022) as they supply to the global markets.

7.4 Automotive OEMs & A&D

The Automotive plus A&D industry has the highest average % COGS from suppliers, and the lowest percentage internally sourced from the company (p=0.018). Their numbers are all around 80% and 20% respectively (compared to sample averages of 60% and 40%). This industry has high degree of localization, because all the OEMs reported that the distribution of final assembly locations was the same as the distribution of their markets. As a consequence, the companies in this industry are increasing their production in EU15 (p=.000), most likely due to the European demand. As a result of these strategy changes/decisions, they expect significantly higher average total cost (p=.037) and higher selling prices (p=.062) per unit. Their products also are rated at a higher unit cost (p=.013). Finally when compared to the other industries, these companies view government incentives to be more important (p=.031).

8. Changes within China:

Since our study has a regional focus of China, we took a more detailed look at the flow patterns for the companies that either have increased or decreased production in China (37 and 7 respectively). In this section we present a brief summary of the results.

The companies that increased production in China operate at a lower tier in the value chain (p=.087). They tend to pay less attention to after-sales service and support quality (p=.023), product quality (p=.059), time to market for new product introductions (p=.003), as well as to innovation and design capability (p=.009), and currency and foreign exchange rate volatility (p=.009). These companies also increased the level of R&D investment (p=.027). As for impact, the companies who increased production in China expect that sales in China will

increase (p=.006), the selling price of their products will decrease (p=.018) and sales in US will decrease (p=.078).

Surprisingly, companies who decreased production in China have a higher level of labor intensity in manufacturing (p=0.002), and operate at a higher tier in the value chain (p=.035). Similarly, companies who did not increase in China have a lower level of value per unit of weight (p<.05). In contrast, companies who did not decrease in China have a higher level of knowledge intensity, and a higher profit margin (p<.05). All of these suggest that a shift of labor-intensive manufacturing from China to countries with even cheaper labor. As for impact, the companies who decreased production in China expect that their China sales will decrease. (p=.005) and the selling price of their products will increase (p=.050).

We also observed some interesting results associated with shifts in sourcing to locations within China, i.e. from one Chinese location to another. In particular, one sixth of the companies in our sample reported a shift of production from coastal to inland China. This movement is correlated with products that have lower level of knowledge intensity (p=.039), higher modularity (p=.089), lower profit margin (p=.059), suggesting these companies are "going west" for simple and standardized products. These companies also care less about Innovation and design capability (p=.045). These results are similar to what we observed for companies moving from China to ASEAN countries in our sample.

9. Decisions Concerning Automation and R&D, Impact on Manufacturing Employment:

53% of the companies responded that they increased the level of automation in their production processes; 27% in their Chinese factories, 12% in the U.S. factories and 14% in EU15 factories. 57% of the companies responded that they have increased investment in R&D; 39% in their Chinese cities, 8% in the U.S. cities and 10% in EU15 cities. We also observed that a low product profit margin is positively correlated with an increase in the level of production automation (p=.082).

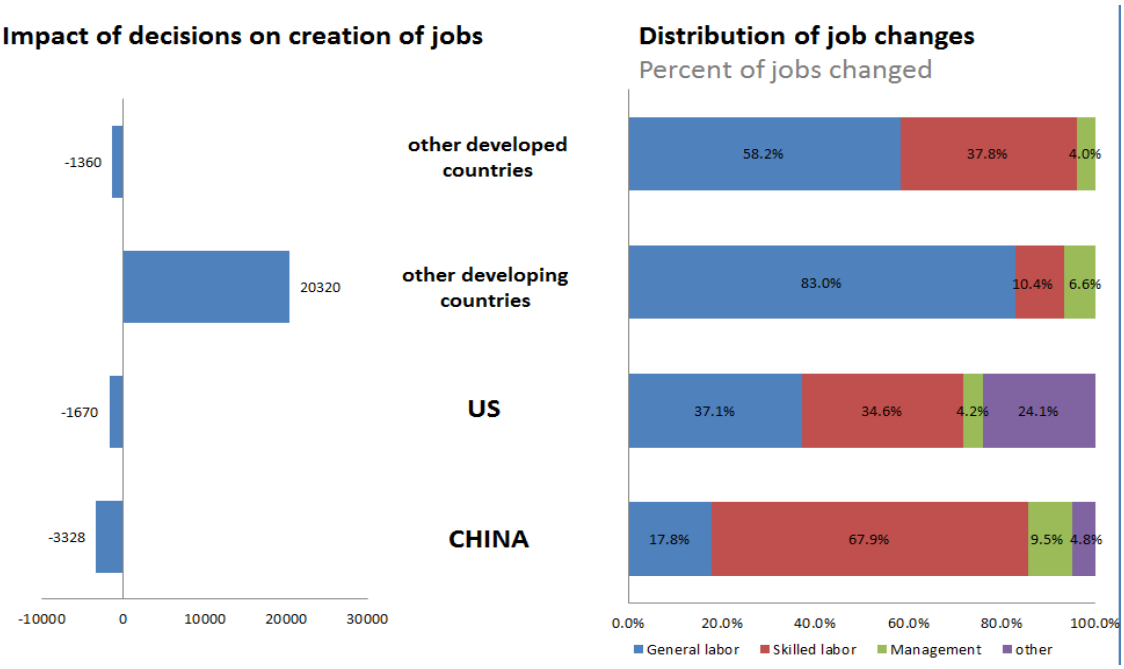

Figure 9: Impact of the Decisions on Job Creation

Consistent with our earlier observation on the positive balance of trade in China and other Asian countries, companies also reported that manufacturing jobs are not coming back to the U.S. It is also interesting but consistent with our other findings that in our sample, China also reported a net decline in the number of jobs created by the reported decisions, see Figure 9. The one region with a reported increase in jobs was in other developing countries, where the majority of the jobs created were at the low skill level of general labor.

10. Conclusions:

As noted earlier, prior to administering our survey, we conducted an informal review of corporate public announcements made from 2010 to 2013 (see Appendix A) concerning changes in manufacturing location by well-known multinational companies, and derived several hypotheses. We now discuss if our field study results support these hypotheses.

H1. *Companies are shifting their production to China in order to gain access to the Chinese market*.

Our sample supports this hypothesis in general by revealing that China is the biggest market as well as the biggest source for manufacturing in the world, and is attracting more companies who are moving into it for access to its growing market.

H2. *Companies are shifting their production close to market demand*.

The study is not conclusive on this hypothesis. In particular, our findings reveal that about half of the companies in our sample reported a production increase outside China.

H3. *Companies are shifting their production to ASEAN countries because of labor cost.*

Our study supports this hypothesis in general as labor cost is found to be the top driver for increasing production in ASEAN countries and that the shift is strongly correlated with product labor intensity. Production that moved into ASEAN countries mostly came from China, suggesting that China is losing (or strategically giving away) simpler, more standardized, labor-intensive products, (e.g. Apparel) to the ASEAN countries. On the other hand, China is attracting more complex/higher-profit-margin products (e.g. Equipment and Machinery and Automotive supplier industries).

H4. *In general, labor cost, market proximity, and government incentives are the most important drivers for global supply chain sourcing decisions*.

Our sample in this study agrees that labor cost and market proximity are the most important drivers, however our results were less definitive for government incentives.

Our study was regional in terms of the companies and managers surveyed and was based on a decision specific focus. We can summarize the principal results of our field study as follows.

1) We observed a complex pattern of movement of production sourcing that is consistent with a network model of the global supply chain. Multiple decisions were made by companies which reflected the fact that companies are currently engaged in significant restructuring and redefinition of the global sourcing and technology strategy.
2) These decisions were made for a variety of reasons and with a range of expected outcomes. The decision focus of our survey provided a rich and robust set of explanations for the observed patterns.
3) As a regional study, we looked at reasons that drove companies to move in and out of China. We found that companies increased production in China due to the importance of its local market, while companies decreased production in China in order to reallocate labor-intensive manufacturing to countries with even cheaper labor.
4) In our sample, we also found a trend of companies Going West within China, i.e., moving production from coastal China to inland China. (One sixth of the companies in our sample implemented such strategies.) Like going from China to ASEAN and other developing

countries, the products whose manufacturing went west within China were simpler, more standardized, more labor intensive and less knowledge intensive.

5) We could not find support for the expectation that re-shoring to North America or the EU15 is taking place on a significant scale with our sample. Rather these regions continue to lose ground or at best are staying even.
6) There were significant differences by industry and product, and market factors also were important.
7) A major policy question worth exploring further is whether China should be concerned about losing jobs due to its rising worker wages (e.g., 3,328 jobs were reported to be lost in China based on responses in our sample, see Figure 9). Our sample, however does not suggest that this will be a major problem in the future. It is evident from our analysis that although China is losing the manufacturing of simpler, more standardized, labor intensive products (e.g. Apparel or ICT), it also is attracting jobs for the production of more complicated / higher-profit-margin products (e.g. Equipment and Machinery and Automotive supplier industries). China remains the biggest source for manufacturing in the world in our study.

10.1 Generalizability

Our field study was designed to be regional and was focused on China, with managers of global firms' Chinese divisions responding. This sample along with our decision based framework enabled us to observe movements within China which other sourcing studies could not see. Our study however, does not provide comparable results based on managers' responses from other important regions and thus the generalizability of our observations is limited.

To address these concerns, we have replicated the field study in the U.S., Western Europe and Japan with participation of a wider set of industries and countries. The analysis of the second sample is ongoing by a consortium of seven universities; see Cohen et al (2015). Analysis of responses from this second survey as well as from other surveys which may be conducted will provide further insights into the extensive re-structuring of global supply chain sourcing and technology strategies that our results indicate currently is occurring in multiple industries throughout the world.

The largest 3 flows observed in our study all had China as either a starting point or as a destination. Will these flows still be significant from data collected outside China? The answer

is yes based on the preliminary results of the follow-up benchmark study; see Cohen et al. (2015): i.e. EU to China is again the largest flow, and North America to China and China to ASEAN are tied at 4th place. We thus argue that there is value in studying these three flows in some detail, as we have done in this paper.

Finally we note that the definition of re-shoring can be ambiguous. Re-shoring can be defined with respect to the demand location, or alternatively with respect to the firm's headquarters location. For example, consider a German firm that produces its product for both the German and U.S. markets in a factory located in Germany. If it shifts production of the U.S. demand for its product to a U.S. factory, is this re-shoring or off-shoring? It is re-shoring of the U.S. demand but off-shoring from the perspective of the firm's headquarters location. In this paper we avoided this ambiguity by adopting the perspective of manufacturing flows. So in our example production has flowed from Germany to the U.S. Our results concerning re-shoring (to the U.S.), as reported in this paper are consistent both with published reports and our ongoing follow-up benchmark survey when we examine reported re-shoring decisions from *a flow perspective*. In particular, 6 of our 49 responding firms (12.2%) increased production in the U.S. This included 2 U.S. firms and 1 Italian, 1 Germany, 1 Taiwanese and 1 French firm, (as defined by their headquarters location). This is consistent with the finding in the follow-up survey which states that"...60% of the investments in North America come from international companies as opposed to 40% from North American firms." We also observed that while 12.2% of our sample firms increased production and 20.4% decreased production in the U.S., i.e. net growth in the U.S. is negative, the follow-up benchmark study observed that 23% increased production while 16% decreased in the U.S, so here net growth is positive. However, in both studies, it is consistent that the majority of the firms that increased production in North America are non-U.S. firms who are increasing their presence in the U.S. for market and innovation purposes.

Thus in conclusion, we acknowledge that the results reported on in this paper are specific to our survey and any generalization of our observations is limited. We do feel, however, that this field study provides important evidence concerning the nature of changes to global manufacturing sourcing and the use of technology that is currently underway.

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Appendix

Table A. Sourcing Announcements (2010 – 2013)

Company	Flows		Drivers												
		labor cost	After sales service and support quality	political pressure to create jobs	product quality	managing the supply chain	building a global network	supply chain flexibility	government incentives	Innovation and design capability	energy cost	logistics cost	delivery lead time	exchange rate	market changes
1.Adidas	from China to Cambodia	✓													
2.Airbus	increase in USA		✓	✓										✓	✓
3.Apple	increase in USA				✓					✓					✓
4.Bosch and Siemens	increase R&D in China		✓												✓
5.Canon	increase in Vietnam	✓													
6.Caterpillar	increase in North America				✓							✓			
7.Changhong Electric	increase in Indonesia, Australia ,Czech, Korea	✓													✓

8.Coach	from China to India and Vietnam	✓													
9.Dell	increase in central and west China								✓						
10.Dow Chemical	increase in USA			✓						✓	✓				
11.Electrolux	from USA to Mexico	✓													
12.ET Water Systems	from China to USA				✓			✓		✓					
13.Foxconn	increase in Brazil						✓								✓
14.General Electric	increase in USA	✓		✓					✓	✓					
15.Global Foundries	increase in USA			✓					✓						
16.Google	increase in USA				✓	✓				✓					
17.Hanesbrands	increase in Thailand and Vietnam	✓					✓								
	increase Automation in China	✓													
18.HP	increase in central and west China	✓							✓			1			
19.Honda Motor	increase in USA and													✓	

	Canada														
	increase in Mexico	✓													
20.Honeywell	increase in China and India	✓	✓							✓					✓
21.Hyundai and Beijing Motors	increase Automation in China	✓													✓
22.Intel	increase in USA	✓		✓											
	increase in Malaysia	✓		✓											
23. Kia Motors	increase in China														✓
24.Lenovo	increase in USA														
25.Master Lock	from China to USA and Mexico	✓	✓												✓
26.Michelin	increase in USA								✓						✓
27.Nissan	increase in Thailand														✓
28. Osram AG	increase in China		✓						✓						✓
29.Otis	from Mexico to USA									✓		✓			✓
30.Panasonic	increase in	✓													✓

	China														
31.Rolls-Royce	increase in USA								✓	✓					
32.Shell	increase in China, India and Russia						✓								✓
33.Sleek Audio	decrease in China				✓										
34.Stanley Furniture	from China to USA				✓										
35.Texhong	increase in Turkey														✓
36.U.S.Block Windows Inc	from China to USA											✓	✓		✓
37.Vancl	from China to Bangladesh						✓								
38.Western Digital	increase in Malaysia					✓									
39.Whirlpool	from Germany to Poland														
40.Yaskawa Electric	increase in USA	✓	✓												✓