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It is a pleasure to introduce you to research at Lund University School of Economics and Management. This booklet provides a small sample of the high quality research conducted at the School. We hope that you will find it in tune with our mission, an excerpt of which reads: “Through research-based education, we shall prepare students to contribute to resolving global challenges.”

The glimpses you will see cover different topics, ranging from Brand Management to Immigrant Careers, from Globalization of Higher Education to Design Science Research. The glimpses also range between broader reviews and more in-depth accounts of, for example, the Statistics of Social Networks. In a similar spirit, the authors range from recently graduated PhD’s to senior professors.

The contributions all contribute in different ways to resolving challenges for business and society. This is obviously true for Population Ageing, where the authors address an issue that is on the top of the policy agenda in many parts of the world, and it is equally obviously true for the topics of Crisis and Growth, and China’s Rise. The relevance and importance of Commercial Micro Lending is also easy to see, and in the review of Research on Law and Management, the theme is its applicability in hands-on business problems.

We believe that the contemporary challenges facing business and society, such as sustainability and economic growth, the renewal of global financial institutions, population aging and health, must be addressed from a broad multidisciplinary perspective.

Therefore the breadth of the research activities at the School is an important foundation for our strategy. In addition to the traditional disciplines in economics and management the School includes departments of economic history, commercial law, information systems and statistics, as well as research centers focusing on research policy, economic demography, finance, entrepreneurship and agrifood economics. We are also part of the leading research university in Sweden. We build strength in the disciplines both as a basis for cross-disciplinary research initiatives and as a foundation for the high-quality teaching we provide. The School of Economics and Management aims at being “more than a business school”, and the breadth and depth of our research is the core foundation of this claim.

Through active collaboration both within the School and across Lund University we can transcend the traditional functional division of research in business schools. Recent multidisciplinary initiatives include research programs on Climate, Energy and Economic Growth together with the Engineering Faculty, Health Economics and Management together with the Faculty of Medicine and, Studies of Global Institutions together with the Social Science Faculty.

If you like to find out more about our research – please go to www.ehl.lu.se/research or give us a call at +46 46 222 34 34.

Allan Malm
Dean
Put Your Brand to Work and Boost Revenues

Can you recognize yourself? Having since long established the desired core values for your brand, you are still not quite sure whether they differentiate you enough from your most daunting competitors, and whether they actually help boosting your revenue growth?

These days, no one is questioning scientific research or other claims that point to the fact that strong brands grow faster, are more profitable and enjoy better reputations than their weaker counterparts. These are some of the primary reasons as to why interest in brands has increased these past few years. Recent research also holds that strong brands boost stock prices, attract better employees and leaders alongside boosting superior financial stability over time than weaker brands. At the time of writing, Interbrand holds Coca-Cola, IBM, Microsoft, Google and GE as the world’s five strongest brands.

Despite this knowledge, far from all companies strategically and systematically work towards connecting the branding process to revenues. And even fewer have a deeper understanding as to how their brand in particular creates value, and exactly what made their brand strong in the first place. And ultimately: what can make it even more valuable tomorrow. They may see the revenues, profitability, job applications and the stock price, but not quite understand how these emerge. A major reason is that they lack the proper models of thought, systems and analytical tools to tie the branding process to the business itself. This leaves a great risk of getting lost and prioritizing the wrong things and building blocks in the branding process.

In this paper we put forth “the brand value chain”, a model and working method for identifying business strengths, weaknesses in one’s own brand as well as threats and opportunities presented by competitive brands. The new and unique aspect of this system is that it connects the soft parts of the branding process, such as image and emotions, with the harder aspects that matter at the end of the day: revenues and market share. Tied to this model we also present some key findings we believe to be intriguing to any company attempting to build a stronger brand, as well as a few mistakes and pitfalls we have noticed companies to struggle with in the process of analyzing and managing their brands. The paper is founded on international research and a number of scientific projects on brand equity that have been conducted at Lund University since 2004. Add into the mix consulting projects for companies such as Alfa Laval, Axfood, Faberge, East Capital, Procordia, FM Mattsson, NIBE and IKEA; companies that collectively exceed revenues of over 300 billion SEK. The paper also rests on interviews with over 100 brand managers, and surveys of more than 20 000 consumers and business-to-business customers spread out over 15 countries in 4 continents.

The Brand Value Chain

The brand value chain is a model that has been developed over the past 15-20 years, in research on the link between brand building and the bottom line. This particular version is one that we have found to work best. It is simplistic, understandable and makes communication specialists, marketers, sales people and strategic managers speak and think in the same way.
The point of the model is very simple: what the target group knows, feels and thinks about a brand (the sum of all associations make up the brand’s image) determine to which extent they want to buy and pay a premium price for the brand (the brand’s strength), which in turn determines the economic value of the brand to the company owning the brand (in terms of revenues, market share, cash flow etc.). That brands have a particular image and can be valuable is of course no news, but the unique aspect of this model is how it puts the spotlight on the two types of brand-related behaviors that create revenues: that the target group wants to purchase more (volume premium) and pay more (price premium). A brand is thus only strong when it helps a company to sell more units and/or command a higher price tag per unit. Being liked, famous or having a positive image can certainly contribute to this strength, but is in itself financially useless. In contrast to many other brand models, the brand value chain has a clear focus on how brands can contribute to companies making more money by creating higher revenues. Which, no doubt, is the reason why it has been met with curiosity from business leaders and other key positions within companies (for example controllers, business developers, CEOs, presidents of sales, and HR-executives if it regards personnel-based industries) that aren’t directly involved in marketing and communication.

The brand value chain works as an excellent model of thought and foundation for further discussions. The most effective use will however be derived from it when it is used as an analytical tool to guide market research and analyses of different kinds. The challenge for businesses will be to figure out how the value chain will be applied to their specific brand and industry, yesterday, today and tomorrow. In other words: what type of image will render our target market likely to buy and pay more to leave us with higher revenues? Once figuring out the answer to this question, making strategic decisions will be easier: not only in regards to brand positioning and advertising, but also in pricing, innovation, distribution and HR.

With the research we have conducted and the consulting projects we have been through, with the brand value chain as a central starting point, we could provide a long list of interesting findings. But, we have instead chosen to focus on those aspects we feel have been neglected the most.

Three Insights About the Brand Value Chain

1. Strong brands are founded upon both hard and soft building blocks

Simply put, brand image (i.e. associations to the brand in target customer memory) can be divided into hard and soft, respectively. The hard entail quality related aspects meeting the customer’s functional needs, and thereby often related to the core product or service. As an example, the performance of cars, the durability of a TV, the formal competence of an audit firm, or the breadth of a supplier’s product line. The soft side is not specifically related to what the product or the service is expected to do for the customer, but rather about how the brand – or the company behind it – is perceived and appreciated in abstract terms. Or the personality it is seen as having – for example prestigious, amusing, caring or inspiring.

In almost all studies we have conducted it has become evident that the soft aspects have as big, if not bigger, impact as the hard. In other words: to a higher extent they get consumers to purchase and pay more for products from one particular brand than others. Some find it strange that, as an example, the quality of the core product is of no essential importance. But in many markets, in fact, there is no big difference in the physical product quality among the major brands, especially in mature markets. And, any physical distinction would likely be difficult for consumers to make out. How many could actually determine whether the tech-
Some examples of soft aspects that have proved vital in our studies are "energy and spirit", shown to be the most revenue driving in a particular travel industry. Or "warm and caring" and "inspiring and positive", that are among the handful of the most driving associations (out of 25) for a certain kinds of foods, trumping things like "quality", "good value for money", "tasty", "healthy" and "fresh". And, for one industrial B2B company, "fun to work with" was shown to have a larger impact on customers' willingness to purchase, and willingness to pay, than perceived product and service quality.

Over and over again, when studying consumers as well as professional buyers we find that decisions are driven by emotions, but motivated and justified by rational reasoning. However, when it comes to our studies on how companies work with brand building, we can only conclude that the soft characteristics tend to fade into the background. When asked about which building blocks are used to construct a strong brand, 1 out of 3 brand managers say product quality, but only 1 in 20 mention some form of emotional or soft aspects. The same thing goes for measurement and progress follow-up, where 64 % measure perceived quality, but merely 45 % measure any emotional association to the brand, and only 22 % some form of brand personality. One of the reasons as to why the softer characteristics are forgotten is that one has come to rely too much on asking direct types of questions, such as "what is important when you choose X" to the target group. The replies are seldom "social status" or "the brand’s personality", since few are aware of, or even want to admit, that they are influenced by that. Instead, projective methods of asking questions and statistical analyses of deeper explanations should be used.

2. The social role of brands is underestimated

One particularly important, and often forgotten, soft building block in branding relates to the social role of brands, and it therefore deserves a thorough discussion. The social role, simply explained, can be expressed in two ways. For one, how we buy, use or want to be associated with specific brands to signal a certain identity or status, towards ourselves or those in our surroundings. Generally speaking, this is most commonly associated with luxurious lifestyle brands, like fashion, but our studies show that social status matters within all industries. Looking at, as an example, everyday purchases, there are a number of retail chains that are perceived to be, for all intents and purposes, exactly the same in most regards. The only factor separating them, explaining why a retail chain does not reach its supposed market share, is social status. Or rather the lack thereof, as shopping in one of the chains would be seen as a bit embarrassing. The same thing applies to the product level: there are few brands of rice that will give you a higher status among peers, but we know that some consumers avoid purchasing rice from, as an example, Euroshopper, as it does not resonate with the image they want to hold of themselves, or want to signal to others (which also explains why some people buy Euroshopper rice only to pour it over into a glass container). The point is that status matters not only in positive ways, but also in negative. It can be seen as a sort of "embarrassment factor". And brands that have been pounded with such an embarrassment-stamp will have a very hard time in swaying new customers to their cause, no matter what changes they make to the physical offering. Even in B2B settings, status matters. A study of steel suppliers showed that it was more crucial for purchasers to be associated with the prestige of a supplier, than what actual product quality, and expertise in steel, the supplier could offer.

The other social role of the brand is to bring us together and create a sense of belonging. Apple, Jeep, WB-40 and Harley-Davidson are common examples of brands that have spawned an explicit brand community. Members of such a community can meet up and associate face-to-face in real life, but a brand community can also have a more psychological character, in form of "sense of belonging". A study of mobile phone brands showed that sense of belonging was more important to the choices of the target group than an array of functions such as camera, flash, music player and touch screen. This psychological feeling of belonging has proved to be important within B2B as well, where on a tactical level it can be built upon everything from golf tournaments and other customer events, to newsletters, seminars and formal education that can be offered to customers. Caterpillar, as an example, has been successful in building a community that both customers and employees alike want to be a part of. When it comes to our studies, extensive research of suppliers of packaging material as well as office furniture have shown that this aspect has far greater importance as to why professional purchasers choose products from one particular brand, rather than things such as delivery capability and guarantees.

Altogether, the social role of brands is somewhat underestimated. It is not merely relevant for lifestyle products and brands with extreme loyalty, such as Apple and Harley-Davidson, but is often an unexploited opportunity for positioning. Nevertheless, our studies show that only about 3 out of 10 companies systematically measure and evaluate what social role their brand plays. In comparison with international firms, Swedish brands are even further behind the curve, boasting only 1 out of 10.

3. Volume and price premium have different driving forces – it is often diverse things that have customers purchase and pay more for a brand.

Ever since we started discussing brands some 30 years ago, it has been established that a sign of a strong brand lies in its ability to allow for premium pricing over competitors. Nonetheless, and even though issues of price tend to be part of everyday life in most companies, they are often left outside the strategic analysis and decision making of the brand. Talks of "if we increase prices, we will lose customers", or "we can't raise prices since it is the trade or our suppliers who ultimately decide upon final prices and price premiums", are prominent. This is of course, in many
cases to a certain extent true, but this does not take away from the significance of creating an understanding of what customers are willing to pay for the brand, and most importantly, what can influence them to be willing to pay more – never mind if you can or have the intention of commanding a higher price tag or not. If you can influence customers to be willing to pay more, and refrain from increasing prices, you have charged your brand with more value for money.

As our studies show, completely distinct associations cause customers to choose and pay more for a brand, respectively. Also, aspects driving price premium in most industries are of softer character. What typically influences customers to be willing to pay more is that brands are cool (mobile phones), sophisticated (travels), inspiring, fun (foods), creative and exciting (steel suppliers) or make advertising that resonates with the target group. The willingness to buy (volume premium) on the other hand, is more often driven by factors closer to the core product or service function, and has to do with reliability and risk reduction. Or being perceived as good value for money (mobile phones), genuine (foods), down-to-earth, having a good market reputation (steel suppliers) or radiate “you-know-what-you-get” (travels). Being perceived as too unique, on the other hand, can be negative from a volume perspective, which is interesting considering how valued the term differentiation is.

Depending on the business and branding strategy the company has adopted, different aspects may need to be brought to the surface - which is a unique and vital point in the brand value chain, where brand strength is defined as the ability to sell volume (volume premium) and command price (price premium). And, those who want to both sell more and charge higher prices need to charge their brand not only with an aura of reliability and risk-reduction, but also with excitement and inspiration. One brand that succeeds with this is Nike. The problem, however, is that most brand managers tend to ignore price premium, or view it as inferior to volume premium. Looking at branding or customer surveys, they regularly contain what influences customers
to prefer a specific brand (measures such as consideration set, purchase intention and preference) but rarely touch upon the willingness to pay of target customers.

In one of our studies of brand managers, only 4 out of 10 stated that they measure and evaluate the willingness to pay of their particular offerings. Our experiences as consultants tell us that even fewer Swedish companies really do this, as none of the companies we have been in contact with are working with a strategic and systematic analysis of the brand price premium. Not only do they risk ending up with an incomplete understanding of what drives revenues in the market, but also risk losing out on attractive opportunities for revenue growth. One of the benefits of price premium, in particular, is that it principally comes “free”, meaning that it does not cost more to command a higher price tag in the same sense that it is more expensive to produce or distribute larger volumes.

How You Can Use the Brand Value Chain – 4 Steps to a Revenue Focused Branding Process.

1. Understand the revenue driving associations of your market

The first step your company has to take is to create an understanding of all customer perceptions that drive revenues, in the form of volume and price premium, in your market. The goal is to identify all individual associations that influence the target group to choose to buy and pay more, respectively, for a particular brand in the market (Fig. 1), and which of these are owned by different brands in the market. This can be done through various market research methods and analyses, such as interviews, focus groups and surveys. When consumer-based data of this kind is combined with sales or market share data, it is called econometrics, a method that is fairly unusual among Swedish companies.

Fig1. Brand image drivers of volume and price premium on a given market.

Indeed, most companies carry out market research, but what distinguishes a sound and relevant analysis is that it (1) creates a complete understanding, and (2) has a clear connection to real-life revenues. This can be done only by identifying both hard and soft image building blocks, alongside insight into what drives choice (volume premium) and willingness to pay (price premium) for brands in the market. It is not enough to include the kind of hard aspects that often tend to be the focus of customer satisfaction and quality surveys – it leaves us in possession of only half the map. Even softer characteristics such as brand personality, social status, a sense of community or emotional associations have to be brought along for the ride in order to make the map complete. Neither is it sufficient to rely on general rules-of-thumb or general models that claim to have all the right answers for all markets, you must recognize exactly what matters to your unique market and brand. After all, one does not buy rice in the same way as one purchases a TV, or chooses a hotel for the vacation. Fortunately, there are statistic tools to determine precisely the extent of your understanding, on a scale from 0-100 % (Fig 2.). If you do not know today how many percent of your revenues you fully understand, it is about time you found out. The danger may be that you have completely missed the point of which perceptions truly are driving your revenues.

Fig2. Ensuring full coverage of the revenue drivers in your market.

2. Identify the revenue driving assets of your brand

Once having created an understanding of the type of image that normally drives the revenues in your market, for all brands, you
must distinguish the strengths and weaknesses of your specific brand. This may also sound like something that most companies already do, but the point is to identify the strengths and weaknesses that drive and restrict your real revenues, respectively – not just how you are perceived in general. Hopefully your brand enjoys some form of unique asset that drives revenues today – and by that we mean that your brand has a unique position in the marketplace that drives the willingness to purchase and willingness to pay in the right direction (Fig 1.). That some brands “own” certain positions is something that is widely discussed, but in fact, few companies really do (that is, retain a statistically assured higher grade than all other competitors in the market). You also have to create an understanding of how your brand in particular may reach its full potential. Some brands sell less than they could, due to, for instance, poor communication or tactical selling. Others sell more than they deserve, thanks to insufficient competition. These two situations naturally demand completely different remedies.

3. Choose core values/position – and let it permeate all activity

Once you have understood what type of image is driving revenues in your market, and what specifically drives, or restricts, revenues of your brand, it is time to make a strategic decision as to what position you want to achieve in the market. There is much to be said about how one should think of this, but we would like to promote a few insights.

As a starting point, the greatest chances of success lie, of course, with further strengthening possible brand assets already possessed (and identified in step 2). If your brand is seen as the best in one type of image (for example highest product quality or greatest social status), that to a high extent is driving revenues in the market, you should do everything you can to defend and fortify that position. Looking beyond, it is of vital importance to make decisions about ambitions: whether the brand should be of a niche character, endowed with a higher price tag and margins, or whether it should be a broader volume brand with its aims set on market leadership. Since they tend to be driven by different kinds of image, the decision will have a great impact on what measures need to be taken when it comes to promotion, as well as price, place and product. After all, a volume brand cannot be too unique or have a too narrow set of offerings, but must be able to meet most needs in the market. A niche brand, on the other hand, must be as focused and specific as possible with its unique benefits, and preferably charge the brand with a strong personality or powerful emotional associations.

Apart from deciding upon the specific type of image you would like to own, you of course also have to remedy any revenue restricting flaws in the brand. It is hard to become the best at something you are poor at, but much stands to be won with at least reaching an acceptable level of performance. The critical aspects that need to be elevated from a poor to an acceptable level can be called points-of-parity, and the aspects you want to own and stand unique with, points-of-difference.

Finally, the internal side of the brand must be taken into account. That is, the internal resources and competencies that determine what you actually are capable of and can deliver to customers, and the internal culture and identity that influence what employees want to do and stand for. If attempting to promise something to the market that the organization cannot, or even want to, deliver on, chances are you will not remain successful in the long run. Especially not in industries where employees have day-to-day interactions with customers, and thereby play a crucial role in the way the brand is delivered and represented externally – as in most service and B2B industries.

The ideal position you should take is thus to focus on a type of image that drives revenues (price or volume, or both) in the market, and that you want to, and actually can, deliver to your customers.
4. Retain long-term focus – with the aid of follow-ups and rewards

The most difficult step in a revenue-driving branding process is to retain long-term and complete focus, in the long run and over all the activities that influence the company. Here we can see that many companies fall short. Many times the branding process is put on the shelf without being integrated into the day-to-day activities. And then it does not matter how good the strategy is, it cannot possibly be converted into reality when people are pulling in separate directions. The result becomes a diffuse brand that neither employees nor customers know what has to offer, and eventually will lose revenues.

So, how should one proceed then? Let us demonstrate one of our assignments as an example, a company in the entertainment industry. They launched their branding strategy two years ago and have since then witnessed substantial improvements in brand clarity and positioning, as well as in customer satisfaction and customer retention. And most importantly: significant revenue growth. We are not surprised - not only have they conducted a comprehensive and complete analysis and developed a good strategy, but have also made sure to keep a sharp focus on the branding objectives. To begin with, focus was placed on a handful of concrete associations (image attributes) they wanted to own in the market, in other words, being perceived as superior to all competitors. But establishing that goal was not enough. A person was internally appointed to be accountable for each separate association. Responsible for being perceived as “the best at customer service” was, quite logically, the head of customer services. Connected to this was a reward system, where each person received a bonus based on his or her efforts in improving the customer perceptions in each area. Twice yearly, the entire board convenes, alongside the people responsible for each area, for an often dramatic account of how the target group’s perceptions have changed – for better or for worse. In addition, all kinds of pre-testing and effect measurements of individual advertising campaigns are permeated by the same focus. They are assessed on whether and how the communications are contributing to reinforcing the desirable associations of the brand, not just what the target group thinks of the advertisement in itself, or if they have seen it. In these ways, it is assured that the branding strategy is pursued in practice.

The questions are hence whether you have identified all customer perceptions that drive revenues, in the form of volume and price premium, in your market, whether you know which positions that you or your competitors own, and whether your brand possesses any revenue driving assets today? If the answers are not yes on all these questions, the risk is that you are trying to navigate your brand with a faulty map.
At the Department of Business Law, we research and teach the areas of law that are of direct importance for businesses. These areas include company law, accounting law, union law and tax law. We are increasingly striving at conducting our research and teaching activities based on a decision making perspective, referred to in research as Law and Management. Instead of looking at legal rules of importance for businesses purely from a legal perspective we are increasingly looking at rules from the perspective of the company’s decision maker (CFO, CEO and Board of Directors). In our teaching, we strive at putting the rules in a business context, simulating situations where the students must relate to legal rules in their business decisions. In our research, legal rules are also put in a business context and evaluated and/or discussed in that context.

It must be pointed out that this kind of legal research is quite novel and not well established. In conducting the research we therefore have to develop, in one sense, a new way of arguing about legal rules where legal rules are discussed. In the following, a project concerning supply chain management and taxes is discussed. It is noticeable that tax advisors have, as regards certain specific aspects, dealt with issues arising in that context. However, legal practitioners discussions tend to be limited to specific legal aspects (where the writer is an expert) and also often oriented only towards tax planning. We have found that there is a need for companies to understand more fully the relationship between supply chain management and taxes and to find a communication platform between the domains. There is also a need to reflect upon rules from a policy perspective – providing input to policy makers on what best treatment is based on both the perspective of the Revenue and the private sector. Here, legal research can provide input to companies and policy makers that tax consultants cannot provide.

Supply chain managers propose changes to global supply chains to increase efficiency and reduce costs. Lead times are shortened and capital bound in the chain is freed if in line with long and short term goals of the company. Tax advisors are similarly suggesting changes to the supply chain to optimise the, above all, corporate income tax position of the business viewed on a global basis. We have taken an interest in the frictions and conflicts that have arisen, and are arising, when structures implemented by supply chain managers conflict with considerations relating to tax and vice versa. This is the overall framework of our research in supply chain management and taxes.

On How Taxes Influence Supply Chain Design
As an example of research carried out within the framework of research in supply chain management and taxes, the research resulting in an article on additional transports due to taxes is discussed (see Henkow & Norrman, Increased CO2 Footprint by Cross-border Transports due to Taxes? Analysis of Interrelated Logistics and Fiscal Systems, paper prepared for the 8èmes Ren-
Direct distribution, such as drop shipment and merge-in-transit, is an example of how logisticians try to simplify the logistics systems and reduce transportation work by changing the network structure and the business processes. Drop shipment is e.g. when the seller of goods does not touch them, but ships directly from a subcontracted manufacturer to the final customer. This creates shortcuts in the goods flow, which reduces lead-time, tied up capital, logistics costs - but also environmental impact such as CO2 emissions due to reduced transport. Hence it makes perfect sense from a logistics and environmental perspective. But we observed a dark side of direct distribution – the impact of taxes and then in particular the Corporate Income Tax (CIT), the Value Added Tax (VAT) and Customs duties. Logistics solutions could be either very costly, or even impossible to implement, when meeting the legal and fiscal reality of the companies’ legal structure and the specific countries involved.

With researchers from both the legal and logistics’ domain we interviewed a number of individuals from 9 different companies on their experiences working with taxes and supply chains. These interviews resulted in a number of illustrations of interactions between the domains. These illustrations were then taken as a starting point for discussing challenges meeting both domains. Our purposes were to illustrate the impact the tax system could have on supply chain design and reflect (both from a legal perspective and a logistics perspective) on how the rules function. Lastly, we also proposed a common communication platform for supply chain issues and tax issues, because we found in our research that there was a need to find ways of communication between the domains.

We found that taxes had a significant impact upon supply chain structures and upon the cost of drop-shipments and direct distribution in particular. The following illustration show one such case were heavy, low cost goods are shipped cross-Atlantic twice to avoid local sales tax rules and CIT exposure in the US. The thick arrow illustrates the flow of goods and the other arrows the invoice flow, payment flow and passing of ownership.

As can be seen the High Corp in the example rather, for CIT and sales tax reasons, had the goods exported and re-imported to the US. If goods were supplied locally, a sales tax of aprox 7-12 % had to be paid by the local supplier. This sales tax was not deductible or refundable for High corp and thus an extra cost in the business making the drop shipment more costly than the lengthy transport. (Figure 1)

The phenomenon of cross-border transportation due to taxes is however not confined only to situations involving the US and the EU. We found very similar patterns also within Europe and in Asia. The European example is particularly interesting, because it high lights some fundamentals in tax planning that policy makers ought to be aware of.

The illustration below shows a Swedish company, purchasing goods in France from a factory in France and selling the goods to a local customer. A drop shipment directly from the factory to the customer seems sensible from a supply chain management point of view, yet, because of exposure for CIT purposes in

![Figure 1: The US Re-route](image1.png)

![Figure 2: The European Re-route](image2.png)
France and VAT registration obligations arising, a transport of the goods to a parking lot in Belgium and back into France was undertaken. *(Figure 2)*

This illustration is interesting from a legal perspective above all from two perspectives. First, the re-route was undertaken to avoid a local VAT registration in France. A VAT registration of a foreign company within Europe must be made when goods or services are supplied locally and the customer is not liable for the VAT on the supply. This was the case in France at the time. However, the European Union rules first of all allow Member States to introduce rules whereby a registration is avoided in the above situation, yet France has chosen not to introduce such rules. Even if such simplifications would have been present it is not obvious that they would have been used. The company in the situation also expressed dislikes of having to handle more than one set of rules. Even if it would be possible to avoid a registration in Scenario 1 above through the usage of special rules, to use these special rules brought about that a special treatment needed to be set up for this particular transaction. But, it was argued, if a supply chain manager saw that a drop shipment was possible without adverse VAT effects in this situation he would, the internal VAT lawyers not knowing, probably propose a drop shipment in a situation where no special rules were applicable, due to the local VAT rules or due to a change in circumstances seemingly (to the supply chain manager) of less importance but vital in a VAT perspective.

The lesson for policy makers is obviously that special rules may look nice in the law book but that they may not always function in a business context. The lesson for businesses is that decision makers in businesses need to be aware of core legal/fiscal principles and consequences of actions in order to avoid making costly mistakes (the penalty fees for non-compliance with VAT regulations in France being extremely high).

The second interesting issue with the European re-route example is the impact of the attitude of the fiscal administration of a country on the decisions of the company. It was submitted that one reason not to register for VAT purposes in France was to avoid an exposure for CIT purposes. However, a VAT registration in itself is hardly enough as a legal basis for France to tax the profit of the High Corp in France. A mere increase in exposure to that risk was, in any event, a deterring factor when the decision was made on how to handle the situation.

In some legal research the law as it is practiced and the law as it is “by the book” is distinguished. This distinction is clearly suitable to analyse certain phenomenon such as that described above. Implications are clear for businesses – knowledge of the local country’s practiced law is essential to be able to decide on a suitable policy, regard being had to legal factors.

Overall, in a research based on a Law and Management perspective, results are important both for policy makers and companies. In this particular example, for companies, the results imply that considerations related to taxes need to be considered when supply chains are structured. We provide a first attempt to mapping transactions (shown in the illustration above) in a manner that is understandable both for lawyers and Supply chain managers.

That an extra transport can change the fiscal situation seems not to be very sound fiscal policy. In this project, and others dealing with law and management, we provide input to policy makers on how the rules functions and what changes that may need to be made. For example, we have also discussed whether the above consequences are intrinsically linked to the fundamental principles applied within each domain or is the result of some odd rules that can be abolished without changing the fundaments of the system (see Henkow & Norrman, SCM principles vs. Business Law principles: challenges and frictions, paper prepared for the Conference arranged by NOFOMA (Nordic Logistics Research Network) in Kolding in June 2010). The results of this research are partly preliminary, yet they indicate that in some cases the impact of taxes on supply chains should not be avoided. States have a need for revenue to finance their activities and companies are dependent upon functioning states when conducting their business. Based on grounds of legitimisation found in political philosophy and generally accepted in western societies everybody should contribute to the state’s functions in accordance with his ability to pay. If it is found (and this is a matter of debate to a certain extent) that a company has ability to pay there is nothing wrong in principle that the company should contribute with resources to the state’s functions. In other situations however the restrictions put by taxes on supply chains are clearly not intended.

**Conclusions**

The legal landscape of a company is vast and colourful and contains both restrains on a business’ possibilities to act but also as support for their activities (in the case of the law of contracts, for example, this has a supporting function in relation to the activities of a business). The importance to handle the legal situation and be aware of it when making a decision is of vital importance in many business decisions. The research presented above of supply chain management and taxes constitutes an example of research where the legal landscape is put into the perspectives of the decision makers of a company and the policy makers of a country and the importance thereof.
Crisis and New Growth - the 2010s in Historical Perspective

Since the financial meltdown in the USA a few years ago, the crisis has developed from a financial phenomenon into a debt crisis and into an even wider structural crisis with a number of challenges of both economic and political nature to the global economy. As such, the crisis might become a turning point for a new trend period in economic growth from the 2010s. This is no coincidence. Even if the concrete events of the crisis may be coincidental, the structural crisis follows a pattern that is deeply rooted in the modern world economy, with crisis as a part of dynamic economic growth.

Research in economic history provides long term perspectives of the present crisis and of possible future trends. Crises with certain common characteristics - preceded by increased competitive pressure globally and followed by new directions in growth - have occurred in a remarkably regular fashion, roughly with an interval of 40 years. Global structural crises occurred around 1850, 1890, 1930, 1970 and, now, once again around 2010. They have been the 40-years-crisis of the global economy. As for the individual at the age of forty, these crises have been a battleground for old and new forces – a clash between established structures and dynamic change. What is special for the global crisis in the modern world is that, so far at least, new forces have been victorious in every crisis. Out of a great variety in reactions to the crisis, some have been successful and others have followed the lead. The outcomes of the crises have turned trends into new directions and opened avenues for further growth. This might be the case for the 2010s as well.

Three Industrial Revolutions

During the last decades, dramatic events have transformed the global economy. The breakthrough of microelectronics and the diffusion of digital information and communication technology interacted with a new flood in globalization. Technological, economic and social changes have been immense at a global level. It has been called a period of industrial revolution.

In the economic history of the modern world, there is a conception of a pattern of centennial epochs initiated by industrial revolutions. Such revolutions are different from political revolutions. Industrial revolutions do not occur overnight and they do not immediately lead to any marked acceleration in economic growth. Growth may even slow down at the height of the revolutionary changes. Rather a strong transformation pressure is created upon enterprises and the whole economy that, within a couple of decades, results in a new basis for further growth over a long period of time. In such a perspective, the microelectronic breakthrough and the ensuing ICT revolution of the late 20th century has been seen as a Third Industrial Revolution that is supposed to characterize much of the 21st century. The three industrial revolutions have had some characteristic features from temporal, technological and geographical perspectives.

The First Industrial Revolution is well known to most people. It took off in the late eighteenth century with James Watt’s improvement of the steam engine and the rise of the factory system as major innovations. The geographical nucleus was still very small. The revolution was centered in Britain and with strongholds in the regions surrounding the Channel.

The Second Industrial Revolution is perhaps less well known as a concept but the innovations are familiar to all in the modern
world. The revolution occurred in the late nineteenth century with the electrical motor and the combustion engine as central innovations. Industry became much more sophisticated with the engineer and with machinery industry and scientifically based industries in the midst of the revolution. The geography had widened with Germany and parts of Continental Europe as well as Northeastern USA leading in the evolving North Atlantic Economy.

The Third Industrial Revolution was, thus, a late twentieth century phenomenon with the breakthrough of microelectronics and with increased knowledge intensive interaction between industry and services. Once again, the geographical strongholds widened considerably with Western USA and Japan, around the buoyant Pacific Economy, joining the regions of the old North Atlantic Economy.

It is probably a coincidence that industrial revolutions have occurred at the end of centuries. It is no coincidence, though, that there is a long time interval between them, roughly a century. Industrial revolutions that profoundly change conditions for further growth do not occur very often and it takes a long time to develop the potentials of the innovations at a wide scale.

... and Six Long Waves

There is a pattern also between the industrial revolutions, astonishingly regular. After some 40-50 years, roughly a generation, focus has shifted from the diffusion of radical innovations in the production sector to the wider infrastructural, social and institutional consequences of the industrial revolutions. Thus, within each centennial epoch, there have been two periods of about 40-50 years forming long waves or long cycles. The first long wave comprises the periods of the industrial revolutions characterized by strong technical transformation pressure among enterprises. In the second long wave much of the transformation pressure is shifted to the political arena and to the social sphere. Innovations within infrastructure and institutions have widened the diffusion of the radical innovations and turned them into General Purpose Technologies, i.e. technologies that have become integral part of the backbone of the social organization. These second waves have entailed the following enlargement of the radical innovations:

From the economic upswings of the 1850s and 1860s, steam engines and modern factories were diffused with the wider constructions of railway networks and steam ships in combination with institutional adaptations to enlarged global interaction on all markets. The expansion was initiated by a number of political events that made states more involved in infrastructural development at the national level, while at the same time interaction over markets for goods, capital and labour intensified globally.

From the 1930s and 1940s a new phase began, particularly in a number of small states in northwestern Europe, while development gained momentum more broadly after the Second World War. Combustion engines and electrical motors were diffused widely in national systems of infrastructures. Complementary to the new material infrastructures, a new social infrastructure was created adapted to urbanization, to the industrial mass consumption society and to the greater reliance upon a world market that had evolved over the twentieth century.

If we follow the same pattern in time and context, we can envisage an upswing after the present crisis that from the 2010s will see the wider diffusion of networks and infrastructure based upon microelectronics (with the Internet as one early expression) integrated with other means of communication, and with institutional and juridical adaptations to these new conditions.

So far, the events around 2010 combine the characteristics of prior financial and structural crises and, furthermore, appear according to the time pattern of the long waves. Thus, one can assume that historical experiences provide relevant perspectives for the future. In the figure below, this perspective is summarized.

Pattern of global waves:
- 1790s- First Industrial Revolution
- 1850s- New infrastructure / institutions
- 1890s- Second Industrial Revolution
- 1930s- New infrastructure / institutions
- 1970s- Third Industrial Revolution
- 2010s- New infrastructure / institutions

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- 2010s- New infrastructure / institutions
The historical pattern of waves and structural crises indicates that institutions and structures stay stable over periods of roughly the length of a generation. This indicates that important elements of social and human behaviour, fundamental to long term development, are rather constant despite the fact that the pace of change in a number of areas is increasing over time. Our time does not differ in that respect.

**New Competition and New Demand**

In each wave, the global economy has been enlarged. New industrializing economies and emerging markets have appeared. For a time, the diffusion of industrialization has stimulated demand overall, but over a couple of decades the output from these economies has expanded leading to increased competition and to downward pressure on prices in large segments of the world market in the last decades of the wave. Imbalances in trade appear more widely and are aggravated with a combination of structural crises and debt crises at the end, resulting in increased pressures towards structural transformation in many economies, both in the center and in the periphery of the world market. The past two decades bear ample witnesses of this mechanism.

During the same decades, consumption has increased in the centre and social patterns have changed more rapidly. The initial technological breakthroughs lead, within a couple of decades, to a rich flow of new consumption goods that increasingly have been supplied at falling prices from emerging markets. When technological change and new low cost producers are combined, prices fall overall on the markets. It is however much harder to lower wages than prices. Entrepreneurial profits are depressed particularly in the high wage economies of the centre. On the other hand, real wages are rising and the scope for consumption increases. The exuberant consumption of the last decade falls well into the line. Thus, decades that have preceded the structural crises – such as the 1880s, 1920s, 1960s and 2000s – have all been happy decades in the centers from a consumer point of view. There have been consumer booms with changing behaviour and new trends on a social level – new consumption patterns have emerged in the centre. Such change in behaviour is to a large extent the unforeseeable effects of prior technological innovations. Despite the fact that imbalances and deficits may have been aggravated, these periods have been important from a long term perspective since new consumer behaviour is one platform for further innovations.

Thus, new competition and new demand put their imprint upon development up to the crisis, increasing the pressure towards structural change. Crises have provoked intensive transformation and adaptation to such new circumstances.

**Some Prospects for the 2010s and Beyond**

A second wave from the third industrial revolution may bring acceleration in economic growth. The historical experience points in this direction. While the impact on growth rates have been weak during the industrial revolutions – they have rather been characterized by the paradoxical combination of technological innovations and low productivity growth – growth rates have actually expanded during the second waves of infrastructural and institutional adaptation to the revolutionary technology. Modernized infrastructures in the mid-19th century and in the mid-20th century brought the First and Second Industrial Revolutions really to fruition. The scope for diffusion of modernization and economic growth has increased globally. This experience provides an optimistic perspective on the decades to come.

However, expanding growth leads to new bottlenecks or obstacles to growth that have to be addressed by innovations, both in technology and in institutions. Expanding growth rates increase pressure on natural resources and on the environment, particularly with growth in economic giants as China and India with a high demand for resource intensive constructions and many material needs to fulfill. The contemporary menace of global climate change makes this challenge to technology and institutions even more acute. The need for political guidelines, that may stimulate long-term investments into new areas, increases, while innovations in the field of energy, food and materials will be richly remunerated.

The further development of a digital infrastructure raises a number of questions as well. Historical achievements such as railways, motorcars and electricity are still pervasive but with the IT revolution conditions for technology as well as for mobility and communication have changed. A new integration of infrastructural technologies, old and new, is on the agenda, clearly so in Sweden.

The Internet and digital communication has lowered costs for information dramatically, putting pressure on all institutional arrangements. Property rights, security, rules for information are all at stake. Historically, innovations such as the mass-produced newspaper and the radio contributed both to wider markets and to access to information and to broadened participation in political decision-making. The clash between old secrecy, now in digitalized form, and new means of mass distributed information is vividly illustrated by the Wikileaks turmoil.

From the point of view of the historical pattern, the present crisis is, in particular, similar to that of the 1930s. In both cases, societies confront the need to adapt infrastructure and institutions to the radical changes of the preceding Industrial Revolutions, with pressure rising largely upon politics. In the 1930s, the response was very apt in a number of small open countries in northwestern Europe, while most large countries were stuck in old structures. This might be the case also in the 2010s.
China seems to be emerging as the most important beneficiary of recent global shifts in economic and political power. The year 2010 confirmed in many ways China’s rapid catching up process, producing double digit growth rates over three decades of economic reforms.

Not only was China admitted as a member of the IMF executive board making the country the third strongest voice in the organization. Thanks to China’s position as the largest holder of US treasury bonds and currency reserves, the country has meanwhile a decisive influence on US-dollar stability. Unsurprisingly, the Forbes magazine ranked China’s president Hu Jintao number one on the magazine’s list of the most powerful people in the world, breaking a long-standing dominance of US-leadership.

Clearly, China’s economic success is without comparison in human history. China’s export producers fuel consumer markets worldwide. A seemingly unlimited demand for capital investment and infrastructure building drives global raw material prices. In parallel, Chinese investors intensify foreign investments in an effort to purchase state-of-the-art technology held by foreign brands such as Volvo or IBM Thinkpad. And most recently, Chinese investments in resource-rich African economies reflect the government’s mid-and long-term-strategies to satisfy the country’s seemingly unlimited need for raw materials. Although China’s rise was necessarily connected with a sharp increase in income inequality, economic reforms have not just benefited the small political and economic elite. Quite in contrast, the proportion of the population living in poverty was reduced from 84 percent in the early 1980s to less than 15 percent, making China the most successful country in terms of poverty alleviation.

Naturally, China’s economic success inspired much theorizing and also myth-making. Western stereotypes are abundant. Much of the public focus is on the strong role of the state in guiding and structuring economic activities. Whether labelled as state capitalism, cadre capitalism or red capitalism, a broad variety of explanations emphasizes the heavy hand of the state as a decisive driver of economic growth and development. Some point at heavy state investments in the industrial sector and a pro-active R&D policy designed to favour large-scale domestic companies and industrial conglomerates in strategic sectors. Others assume that weak intellectual property rights protection was actually a deliberate strategy to help domestic companies in their efforts to quickly close the technology gap with international competitors. Finally, many point at China’s exchange rate regime which systematically undervalues the local currency and thereby helped exporters to quickly gain global market share.

While all of these observations are certainly true and provide a partial explanation of China’s success story, they provide only a biased and fairly incomplete account of China’s economy. Most importantly, they do not suffice to explain the growth miracle and the country’s rapid move towards capitalism. Surely, the government still plays an important role. Notwithstanding, the focus on government-directed economic policies ignores
important structural features of the economy. In a unique privatization move, the number of industrial state-owned enterprises decreased by more than 50 percent from 127,600 to 61,300 firms between 1996 and 1999, while the production value of SOEs fell to 28 percent of gross industrial output and since then stabilized around 30 percent. For industrial production, the combined production value of state-owned firms, state-owned limited liability companies, and jointly held state-owned enterprises was even down to 19 percent in 2008. In parallel, private sector activities have increased dramatically. By 2008, private manufacturers contributed already close to 40 percent of China’s total industrial product.

Institutional Obstacles

Private company development, however, certainly does not fit the stereotype of the Chinese state actively promoting and subsidizing economic development. Quite to the contrary, private companies usually stem from bottom-up initiatives of individuals and private companies at the grass-root-level. Often these companies operate outside of the purview of preferential state policies and face instead severe institutional barriers. Most importantly, private entrepreneurs usually lack access to bank financing. A World Bank cross-country survey conducted in 1999 ranks China’s private-sector lending at a level comparable to Haiti, Ghana, Syria and Rwanda (Pei 2006: 116). Official statistics confirm persistent discrimination in bank financing. In 2007, state-owned and non-state commercial banks allocated only 1.3 percent of total loans to private firms (National Bureau of Statistics of China 2008). State-owned bank lending to private firms was even lower, with approximately 0.7 percent of total loans granted to private firms or self-employed entities (China Financial Statistics 2007). Many private firms do not even have overdraft facility in their bank accounts to allow short-term flexibility in the event of cyclical and seasonal cash-flow problems. Even at the peak of the current economic crisis private companies did not benefit from China’s generous stimulus package. Though private firms applied for government support, state-owned banks routinely rejected their loan applications.

Private firms experience similar disadvantages when it comes to access to state-sponsored R&D programs. Only 5.8 percent of government funds earmarked for innovative activity went to private firms in 2007. By contrast, 82 percent of government innovation funding was awarded to state-owned enterprises and public corporations where government units owned the majority shares (Statistics on Science and Technology Activities of Industrial Enterprises 2008: 81). Those private firms receiving support typically already are successful leaders in their industrial niche. Also, these firms generally represent industries of national strategic importance. For example, Lenovo computers, an offspring of the Chinese Academy of Sciences, was, since its founding in 1984, sponsored and promoted by national R&D programs to become China’s first global computer brand (Ling 2005).

Finally, property rights protection of private companies is still not up to international standards. In its most recent report, the Heritage Foundation ranks the security of property rights in China on par with Angola, Belarus, and Uzbekistan, and slightly lower than Russia. According to the assessments of 2400 Chinese Chief Executive Officers participating in the World Bank’s Investment Climate Survey in 2002, the predictability of the judicial system was only 17 on a scale from zero to 100.

Rapid Development

In spite of serious institutional impediments and lack of government support, private firms are developing rapidly. Whereas official records noted only 140,000 registered private firms in 1992, their number was up to 6.57 million by 2008, turning the sector from a once marginalized supplement into a mainstay of the economy (Annual Report of Non-State-Owned Economy in China 2009: 003). Moreover, private firms are rapidly closing the technology gap. In 2008, 38 percent of patent applications submitted by large- and medium size enterprises were from state-owned enterprises, but 18 percent were from private firms (National Bureau of Statistics of China 2009). Clearly, even without government funding for research and development, private firms were closing the gap with state-owned firms in industrial innovations. The growing innovative power of private firms is confirmed by a recent study of the Boston Consulting Group which lists four Chinese companies in its 2010 list of the 50 most innovative firms in the world: three of these companies are private (BYD, Lenovo and Haier), and only one is state-controlled (China Mobile). During the economic crisis, it was not the heavily supported state-sector which first returned to normal opera-
tion, but the private firm sector. Entrepreneurs adapted flexibly, cut down labor, adjusted their product portfolio, and shifted export markets to regions less affected by the economic crisis. Interviewed about their recent experience during the crisis, most of these entrepreneurs actually reject the idea of government support. To the contrary, many perceived the economic downturn as a normal market reaction that needed entrepreneurial responses rather than state support.

Clearly, a one-sided perspective focusing on top-down government policies emphasizing state production and political support reflects the stereotype of a communist economy which no longer exists. It is the rise of a capitalist spirit which developed underneath the surface façade of communist leadership, which is the often neglected driving force, explaining much of China’s growth performance. Through social networks embedding entrepreneurial activities, individual actors have learned how to circumvent institutional barriers and policy discrimination. It is the rise of informal lending networks, mutual cooperation and self-help, which has facilitated the rise of a private firm economy outside of the state-sponsored mainstream economy. This development was neither envisioned nor supported. Yet, it is a crucial determinant of China’s economic rise and growing market integration. Reference to undue state-support and subsidized productions is therefore a convenient, but clearly not a satisfactory approach.

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Design Science Research in Information Systems and Technology

Research in the Information Systems (IS) discipline concerns the study of design, implementation, and use of IS/IT artifacts. The range of IS/IT artifacts is broad and includes, for example, methods (algorithms, development methods) and instantiations (specific IS, IT products, and IS enabled business processes). Examples include IS/IT-enabled social networks, Decision Support Systems, Auction Markets, IS-based supply chains, system development methods, IT governance strategies and more.

The Department of Informatics carries out “traditional” behavioral science research where the main aim is to describe and explain IS phenomena. Part of this behavioral science research has addressed the following topics:

- IS implementation processes, for example, the implementation of an Enterprise Resource Planning system like SAP/R3 in a call center
- Effects of IS use, for example, managers’ perceptions of the impact of an Executive Information System on organizational intelligence, decision making, and structure (an issue related to how firms can compete on analytics)
- IS governance and management, for example, a study of the decision process in outsourcing of IS
- IS development, for example, studies on software process improvement (SPI)

Over the last years we have seen an intensive debate regarding the relevance of research done at Business Schools. The critique has been voiced by well-known scholars like Henry Mintzberg, Warren Bennis and James O’Toole under headlines such as “How business schools lost their way.” There is also a lively and intensive debate in the IS community on the “crisis in the IS field”. Some commentators argue that part of the crisis is related to utilization and relevance problems: research not addressing relevant issues and research not producing useful and usable results. In general, it seems that too much IS research is “method-driven” and/or “theory-driven” and not “problem-driven.” Topics are chosen not because they are important, but because they are amenable to analysis by the ruling “méthode au théorie du jour.” One way to increase IS research utilization and relevance is to produce more IS design science research.

Broadly, in IS we can distinguish between behavioral/social sciences and design science research. As said above, behavioral/social science research aims at describing and explaining phenomena, and sometimes also to be predictive. Design science research (DSR) aims at developing solutions to practical problems. To put it simple, behavioral science is driven by a search for “truth” and design science research is driven by a search for solutions. Part of DSR’s foundation can be found in Herbert Simon’s work on the sciences of the artificial (Simon was awarded the Nobel Memorial Prize in Economics and holds a honorary doctorate at LUSEM).

A fairly large portion of the research done in the depart-
ment is DSR. Recent projects have focused the development of: 1) design propositions for organizational implementation of Knowledge Management Systems, 2) an approach for designing Management Support Systems, and 3) an approach for designing and developing mobile IS. Below, we describe two on-going DSR-projects: 1) IS integration in mergers and acquisitions, and, 2) a digital, rule-based service for the coordination of child vaccination (VacSam). Another on-going project is the development and use of a socio-technical IS design science research (STISD) approach. This approach complements the view of IS design science research as a ‘hard’ engineering practice.

**IS integration in Mergers and Acquisitions**

In this project we addressed a critical issue for firms involved in mergers and acquisitions (M&A), namely IS integration. Data suggests that of the about 28,000 corporate M&As that were carried out in 2008, roughly speaking two thirds were financial failures. IS integration is cited as the third most important reason for M&A failures, and approximately 45% of the expected benefits from M&As are directly dependent on the IS being integrated. In a survey by Accenture, only about 40% of the 400 interviewed enterprises reported that their last M&A-related IS integration had been successful. To summarize, in many M&As IS integration is critical for achieving the intended goals of the M&As, but the knowledge on how to manage IS integration in M&As is to a large extent lacking.

The aim of the project is to develop a model to be used by organizations in their M&A processes. The model does not address pure technological issues. By integrating previous research on M&A and IS integration, we developed a six dimensional theore-

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1 Principal researchers: Stefan Henningson and Sven Carlsson
DySIIM dimensions and relationships

DySIIM has six dimensions and a number of relationships between the six dimensions (See, Figure). The dimensions are:

- Synergistic potential, which addresses if the M&A is driven by technical economies, pecuniary economies, or diversification economies
- Organizational integration, which addresses: 1) interdependency type (pooled, sequential, or reciprocal integration), degree of integration (holding, preservation, symbiosis, or absorption), and 3) integrated activity (primary (operational) or secondary (supportive functional))
- Intentions & Reactions of the M&A in terms of: friendliness/hostility (rescue, collaboration, combination, or takeover), and reaction (turnover rate, level of distrust)
- IS Ecology in terms of what organizational function(s) to support: infrastructural, informational, transactional, or strategic
- Integration architecture to be used including: 1) integration level (IT, infological, organizational (business)), and 2) integration structure (point-to-point, middleware, enterprise-wide, meta-level, Service Oriented Architecture (SOA))
- IS integration role: proactive or reactive

The model has been used to develop design guidelines for the improvement of management of IS integration in M&A. Generally, these are in the following form: in problem situation (P) and context (C), to achieve outcome (O), then act according to design proposition(s) (D), for example, “If the company

frequently engages in M&As and needs to develop a strong IS integration capability, using internal IS professionals and not consultants can enhance that capability.” The design propositions are primarily heuristic propositions, which means that they do not guarantee success, but they can support the development of successful systems or actions.

In developing the model, the four cases represent two different value configuration models: 1) value chain with the value creation logic of transforming input to output, and 2) value shop with the value creation logic of solving customer problems. In future research we will try to validate the model in a value network context, for example, by studying a merger of two banks.

A Digital, Rule Based Service for Coordination of Child Vaccination – VacSam²

Vaccination is a global issue of increasing importance. Vaccinations are prescribed in accordance with schedules that vary per country. When immigrant children enter the Swedish health care system, it is problematic to coordinate vaccinations prescribed in previous countries and further vaccinations to be given according to the Swedish schedule. In 2008, 120 000 children (up to 18 years) lived in Sweden, but were born in another country. The Swedish vaccination coordination problems are in focus for the VacSam project. It is assumed that an IS service can alleviate this problem.

The functional result of the project will be a digital service for vaccination schedules according to Swedish standards, independent of the country or countries where previous vaccinations have been given. Swedish physicians have current difficulties in giving individuals the correct vaccinations due to lack of information and coordination. The VacSam project addresses this need.

The live digital service will be evaluated as the second deliverable from the project. Additional project results are an evaluation of the developmental methodology for inter-organizational creation of IS services. Part of the project will result in a doctoral dissertation on Business Rules oriented IS development.

This service will be used by workers in many health-care sectors. Coordination is based on the rules used will use each country included in the IS service knowledge base, containing vaccination schedules, regulations and instructions on different vaccines.

The digital service will be developed using rule-oriented methods and service-oriented design. The development of a service addressing the coordination of vaccination requirements also creates a knowledge base, which can be, utilized in the future development of digital, inter-organizational services. Suitable areas are those that use rule-based decisions, where taxation is one example. The VacSam project will study rule-oriented IS development as well as how inter-organizational development can

² Principal researchers: Nicklas Holmberg and Odd Steen
coordinate several authorities and organizational levels to create a shared digital service.

The following organizations are members of the VacSam project: The Swedish Institute for Infectious Disease Control (SMI), Lund University, and Cybercom Group Sweden. Users of the digital service are recruited from the county councils and VACSATC (Vaccine Safety - Attitudes, Training and Communication). Apart from these members the county councils, municipalities, The National Board of Health and Welfare (Socialstyrelsen) and ECDC (European Center for Disease Prevention and Control) are concerned. ECDC has developed a model for national vaccination schedules for the EU. Vaccination schedules for the rest of the world can be obtained from WHO (World Health Organization). So far, the project has developed circa 2000 business rules based on regulatory texts from e.g. The National Board of Health and Welfare (Socialstyrelsen).

The EU shows great interest in upscaling VacSam to a European level. In this case, the research scope broadens and the project will grow significantly, requiring new cooperation with research groups and governmental agencies across Europe.
Sweden has been undergoing a process of population ageing, which is defined as an increase in the mean age of the population, over a period of more than one hundred years. Given existing problems regarding the organization and financing of elderly care, as well as healthcare in general, the question of how Sweden will cope with the large Baby Boom generation when it leaves the workforce and enters retirement is becoming increasingly pressing. There exist significant worries concerning how the future financing of the welfare state will be secured.

The share of the Swedish population over the age of 65 increased from eight percent to seventeen percent during the 20th century. This impressive increase marked a pronounced change from the previous stability of the population structure dating back to at least 1750. The population pyramid for Sweden in 1900 (see Figure 1) had the classic shape, with a broad base made up of younger people successively tapering off with increasing age to a pointed top - a shape which was common in all agricultural societies in the past and found in many developing countries today.

Figure 1. The Swedish age structure as percentage of the population in each five-year age group, 1900 and 2000. Males on left, females on right.
As seen in Figure 1, the population structure in 2000, however, showed that this traditional pyramid shape had been replaced by a more urn-shaped age structure, with a smaller base of young people and wider top of the elderly than before. The proportion of elderly is expected to continue to increase, making the form more and more rectangular.

The reason why the share of elderly has increased may appear obvious: life expectancy has increased and people are living longer. Average life expectancy in Sweden has indeed risen considerably during the past century, as in other parts of the world. Although these developments have indeed been impressive, they have had a limited impact on population ageing so far. In fact, the improvements in life expectancy initially rejuvenated the population, since the early increases in life expectancy were driven by a decline in infant and child mortality. Consequently, most of the actual years gained through these increases were below the age of 65. For Western countries, it was not until life expectancy at birth passed approximately 72 years that the increase in life expectancy was driven by a reduction in mortality among the elderly, thus contributing to population ageing.

Declining Fertility

Instead, the primary cause of population ageing has historically been declining fertility. This may not appear obvious, but when thinking about the mechanisms behind it, it becomes clearer. Population ageing is simply defined as an increase in the mean age of the population. This mean age can be raised either through increasing the number of elderly relative to the population as a whole or by decreasing the number of the young. The latter is what was primarily occurring throughout the 20th century, when the total fertility rate decreased from 4.1 children per woman in 1900 to 1.6 children in 2000.

Population ageing took place in all industrialized countries during the 20th century, with the difference being that the process was more pronounced in Sweden. Several industrialized countries have, however, passed Sweden in the ageing process during recent decades. Population ageing has evolved into a global phenomenon, also affecting many newly developed and developing countries. Taken together, the share of the world’s population above the age of 65 is currently increasing and is projected to rise from 6.6 percent in 2000 to 16.4 percent in 2050.

Initially, population ageing was not a problem for society. The factor that caused population ageing, the decline in fertility, was also its solution. First, it had positive effects on economic growth. Population growth implies capital dilution, unless additional capital is augmented, which means that per capita consumption is held back. Consequently, the larger the decline in population growth rates, the less output needs to be allocated to investment in order to sustain each worker with a given amount of capital. The deceleration of population growth therefore had positive effects on the economy. Second, the reduction in fertility during the early decades of the 20th century was so rapid that it more than compensated for the increased share of elderly. The dependency ratio – the share of the population either too young or too old to work relative the working population – declined. In the longer run, however, when fertility rates stabilised at a lower level and mortality went from rejuvenating to ageing the population, the share of elderly in the population not only continued to increase, but the dependency ratio increased too.

![Figure 2. Share of the population in age groups 0-19, 20-64, 65+, 1860-2050.](image-url)

Source: Statistics Sweden.
As this dependency ratio increases, with fewer and fewer workers available to support the entire population, Sweden will face increasing difficulties maintaining the welfare levels enjoyed in the past. A simple calculation of age-specific income and consumption shows that from their early 20s through almost 70 years old, the average Swede consumes roughly 200 000 SEK/year (based on calculations from 2003). This consumption is more than offset by labour income, and it is not until the individual reaches his/her late 60s that consumption exceeds income. At this point, consumption begins to rise in a monotonic fashion, to the point where individuals in their 90s consume between 400 000–500 000 SEK/year. This increase in costs is publicly funded, with private consumption remaining stable at less than 100 000 SEK/year. It is primarily healthcare costs that increase by age, with the largest component being inpatient care during the final years of life.

In the case that an individual consumes more than he or she produces over the lifetime then we can begin to discuss the issue of life-cycle deficits. As we live longer lives, we see a greater cost associated with being elderly, simply through more years being spent in that stage of life. Without changes in retirement age or decreases in welfare, this can easily lead to this life-cycle deficit becoming a fact. Taking current figures on age-specific consumption and applying them to the population structure as we believe it will develop until 2050, we can arrive at a total life-cycle deficit for the entire country.

This total life cycle deficit, defined as the aggregated consumption minus earnings for every age category in a given year, will, if Statistics Sweden’s projections are accurate, increase by 350 percent through 2050. With no changes in the economy whatsoever, this deficit will be impossible to finance without experiencing a general decrease in welfare.

Since population ageing is a demographic process, it seems logical to begin with an examination of potential demographic solutions to solve it. These possibilities are basically restricted to an internal solution of reversing the downward trend in fertility, and an external solution of altering the age structure through immigration.

No Easy Demographic Solutions
Future increases in fertility would initially lead to an even less desirable dependency ratio, due to the fact that very few individuals work before the age of twenty or more and parents tend to reduce their supply of market labor. In the longer run, however, an increase in fertility can counterbalance an increasing share of elderly in the population. The question remains as to how to increase fertility.

The Swedish political debate seems to focus on immigration as the one viable solution to bottlenecks in productivity caused by an ageing society. The logic behind this line of thought is that migrants are overrepresented in the lower working ages, and as such, immigration would appear to be a good solution that lowers the average age of the producer without increasing the population share that is below working age. However, this intuitive understanding is not quite as straightforward as it may appear. Calculations by both the United Nations and independent researchers have shown that migration cannot reverse the trend of population ageing, at least not in the long run.

Since demographic solutions do not appear particularly viable, we must likely look to other answers to this challenge. One possible solution lies in mobilizing the potential workforce so that a greater share of those of working age actually work, while another solution can be found in productivity growth. Yet another solution is pushing up the retirement age in response to longer life expectancy.

How realistic is it then to postpone retirement? For one thing, life expectancy is likely to continue to increase by several months per year into the near future. Our calculations show that retirement needs to be postponed by about one month per year to keep up with expenses, which seems possible given that at least as many good as bad months are added to our lives when life expectancy increases. As a large part of the costs for hospital care stems from the last few years of life, it seems reasonable to assume that the increase in the consumption curve could be shifted towards higher ages. What about the production curve? Again, it seems reasonable to assume that the ability to work expands. The question is then whether enough job opportunities for the elderly can be created.

The actual solution to financing an increasing share of elderly is unknown at present. It is, however, unlikely that Sweden will rely entirely on productivity increases and tax solutions to the ageing problem, the main reason being that we can assume that workers will not be satisfied keeping consumption at the same levels as today but will expect living standards to increase as productivity goes up. More likely, we will see a combination of solutions where an increase in retirement age and in number of working hours will be essential parts.
It is difficult not to notice that the word network has become a part of everyday language. The current interest in the term seems to reflect a shift, from a focus on the members of a system to interest in the interconnections among those members. For, loosely speaking, the word network refers to a system of interconnections, whether among individuals, organizations or the components of a system, that is, among the actors of a network.

Networks have become an important part of our highly interconnected, information-rich modern world. Today it is increasingly necessary to access information quickly and to work together effectively in groups and organizations. In fact, research shows that creative and effective work doesn’t usually occur when people work in isolation. Instead, it tends to take place most often when people get together in personal and professional networks where they can share their ideas and knowledge. In the business world, participants meet in formal and informal groups to exchange business leads and referrals, build new business relationships and generate new opportunities. Every self-respecting university department participates in research networks involving national or preferably international participants. People work together more and more in cyberspace as well. For example, many professionals (85 million in over 200 countries) belong to LinkedIn, a business network where members create profiles summarizing their professional expertise and accomplishments.

In the private sphere, we are increasingly defined not only by who we are and what we do, but by who is in our social network. Although social networks have always existed, now digital network sites have made it possible to easily broadcast ourselves as public persona and to establish extensive contacts with the click of the mouse. Sites such as MySpace, Facebook or MSN have attracted millions of users and have become a part of the daily life of, mostly but not only, the younger generation all over the world. Analysis of social networks, business networks, and information networks is thus often an important means of studying such diverse phenomena as business contacts, learning systems, social structures or information flow.

Some Important Concepts

Given the recognized importance of networks in today’s modern world, it is hardly surprising that research into social networks has become very “hot”. There is more and more interest in how such networks function, how they can function better and what can be learned about human and organizational behavior by studying them. Since networks can involve thousands of actors, researchers must make advances in statistics and create new computer algorithms in order to describe and study them. Here I will introduce some important concepts that researchers use to investigate networks, and talk about some ways we apply these concepts in practice. For those unaccustomed to mathematical and statistical formalisms, I illustrate these concepts using straightforward examples that do not in any way display the complexity.
that network analysis allows us to deal with.

The researcher credited with starting social network analysis is a psychologist, Jacob Moreno. He used the network concept to explain what seemed to be inexplicable behavior. An epidemic of runaways had occurred at a school in upstate New York in 1932: fourteen girls had run away during a 2-week period, a rate 30 times higher than the norm. Moreno suggested that the epidemic could not be explained simply by the girls’ personalities but rather by their position in social networks. He mapped their social interactions in the form of a network by describing their relationships as either a mutual or a one-way feeling of attraction. He argued that it was their position in the social network that determined whether and when they ran away.

Closeness and Connectedness

So, how do researchers analyze social networks? To use a simple example, let’s say you have a group of people and want to study mutual friendship patterns among them. In network analysis we visualize such interactions by representing people as points (we call them nodes). If there is a friendship connection between two group members, we indicate this by drawing a line (called a link or an edge) between the two people. (We denote a link between nodes A and B using the symbol A–B.) If there is no relationship, there is no link. Networks quickly become highly complex when the number of actors increases. In a group of 4 people, there are 64 possible friendship patterns, while a group of 6 people already has 32768 possible patterns. It is the researchers’ task to develop good methods for analyzing such complexity in precise and useful ways.

There are many aspects of relationship structures that researchers can explore. For example, we can look at networks of contacts between companies to try to discover whether there are subgroups with properties of interest. This might reveal that some companies have unexpectedly “tight” contacts, thus forming so-called cliques. In a clique each member has business contacts with every (or almost every) other member. We might discover that a network actually consists of several cliques which in turn seldom communicate with each other. We could also study other contact patterns, for example, we may want to find out how many contacts are shared by actors A and B. This is a very relevant property when A, not being a contact of B, needs to get in touch with B.

To quantify the way actors communicate with each other, we define a measure of closeness between each pair of actors. If actors A and B are in direct contact, the distance between them equals 1. If they do not have direct contact, they may communicate through common contacts. For example, company A does not have direct contact with B, but a contact can be established since the following links exist: A–C–B. Consequently, the “distance” between A and B equals 2, and we say that there is a path of length 2 between companies A and B. If the shortest path between A and B is A–C–D–B, the path has length 3, and so on. An actor has a central position in the network if he or she has a very small sum of distances to all other actors. This position can give considerable power in the group.

Another important property of a network is connectedness, which means that every pair of actors is connected by a path. Sometimes we can partition actors into several groups with a path between every pair of actors in the group, but without a path to the other groups in the network. We say that such groups constitute connected components.

The path connecting two actors in an acquaintance network can in fact be remarkably short, even in very large populations. This fact is what leads to the popular notion of “a small world,” and to the well-known concept called “degree of separation.” (This idea has passed into folklore via John Guare’s 1990 play “Six Degrees of Separation.”) For example, I am an acquaintance
of Professor Smith, and he in turn knows the Minister of Higher Education, who is an acquaintance of the Foreign Minister of Sweden, who is an acquaintance of President Barack Obama. In other words, there are only three intermediaries separating me and President Barack Obama. Thus I am connected to President Obama by path of length 4. (Funny, I haven’t been invited to the White House.) Based on mathematical models, scientists conjecture that in the United States at least 50% of pairs of people can be connected by acquaintance paths with no more than two intermediaries.

We may often want to simultaneously study several relations among actors in a given group. For instance, we may want to study both the flow of information within a group of companies and possible cross-ownership among the same companies. To do so, we can first ask every company to name the other companies to which they convey information. There are four possible relationships between any pair of companies:

1. They don’t communicate,
2. Company A sends information to company B, but doesn’t receive information, A → B
3. Company B sends information to company A (without response from A), B → A
4. Both companies send information to each other (a mutual relationship) A ↔ B.

The network has so-called directed links, which are represented above by arrows instead of lines. At the same time, we could include information about cross-ownership among the same companies. We may define an ownership relation to occur between companies A and B if company A owns, say, at least 15% of company B. Studying simultaneously both relations may reveal possible interactions between information flow and cross-ownership.
To give a taste of other types of questions we can study, let’s say that in investigating information flow in a group of companies, we observe that a path $A \rightarrow D \rightarrow F \rightarrow C$ exists. Here we have a directed path in which all the arrows point in the same direction. This means that companies $D$ and $F$ are in control of information flow between $A$ and $C$. This gives companies $D$ and $F$ potential power to slow down, distort or speed up the information exchange from $A$ to $C$. It can also be seen of interest to identify pairs of companies lacking paths.

We can also refine our description of a network’s structure by considering, together with the pattern of interactions, the properties of actors. We can, for instance, include information about the size of companies or the gender of individuals and investigate their effects on, say, information flow, friendship structure or professional contacts. In so doing, we hope to generate a fuller description of the network.

Statistical theory and statistical techniques allow us to move beyond only describing network data. We can actually acquire a theoretical understanding of the nature of the network by introducing stochastic (random) components. As a result, we can understand aspects of networks even when our knowledge about the network is limited. Such lack of knowledge often occurs because we are only able to observe part of a network. In addition, our knowledge may be distorted by the fact that, for example, data are missing about relations between certain pairs or the measurements of network variables studied were faulty. Using statistical models makes it possible to incorporate such possible shortcomings into our analysis, thus providing a more realistic understanding of a network. Statistical inference methods provide guidance for collecting and analyzing the network data.

### Modeling Networks

A main challenge in modeling networks is to develop models that are complex enough to satisfactorily fit network data of interest, but are still statistically manageable. Let’s consider again our example of the contacts among a group of companies. There could be many plausible properties we would want to incorporate in our analysis about how contacts affect each other. For instance, we may want our model to reflect the fact that companies sharing common contacts are more likely to be in contact with each other than those that do not share common contacts, a property called transitivity. Or we may want our model to assign a higher probability to networks having certain patterns of popularity (measured in terms of how many contacts every actor has). Here, I will describe four statistical models which turned out to be widely applied with great success in the study of networks.

### The Bernoulli Graph

The first model was introduced by two Hungarian mathematicians, Paul Erdős and Alfréd Rényi. It is commonly called the Erdős-Rényi graph or Bernoulli graph model. (A graph is mathematical term for a network). In this model links appear independently, with the same given probability $p$. The Erdős-Rényi graph model greatly reinvigorated the study of pairwise structures and has, since then, been studied, mostly by mathematicians, probabilists and physicists, in thousands of research papers.

Researchers were puzzled by various asymptotic properties of the Bernoulli graphs. (Studying asymptotic properties of Bernoulli graphs means that we are looking at the graph when the number of nodes, $n$, grows large). It is not the simplest task to explain these findings but I will make a brave attempt. First, allow the link probability $p$ to be a function of $n$, requiring that when the graph has more nodes, the probability of a link decreases. For example requiring that $p=1/n$ gives that: in the graph with $n=100$ nodes, we force the probability of a link be 0.01. However, when $n$ increases to 10000 we decrease the probability of a link to 0.0001. Why do we need to introduce this condition? Because if $p$ is too large the graph would be saturated with links, and all the properties we want to explore would be trivially satisfied.

It has been discovered that, when slowly increasing the value of $p$, the component structure of the graph shows a remarkable transformation. If $p<1/n$, then the connected components found in a graph are all very small (i.e., the components have very few nodes). Allowing $p=1/n$, the largest component will then grow in size and will include $n^{2/3}$ nodes. Furthermore, if $p=c/n$, where $c > 1$, then a graph will have a unique giant component containing a positive fraction of the vertices. However, the most amazing transformation happens when $p$ grows even further and is just under the value $\ln(n)/n$, where $\ln$ stands for the natural logarithm. The graph then contains isolated vertices, and thus is not connected. However, when $p$ just exceeds $\ln(n)/n$, our entire graph is now connected. We say that $\ln(n)/n$ is a sharp threshold for its connectedness. A slightly modified version of this model,
called percolation, has been applied by physicists to describe interconnections between particles.

**The Blockmodel**

Statisticians found that the Bernoulli graph provided a poor fit when modeling heterogeneous networks; that is, networks in which various parts exhibit different properties. To address this problem, a so-called blockmodel was proposed. This model connects the structure of a network to the properties of its nodes. For instance, it seems plausible to assume that the friendship contacts in a school class could be affected by the gender of the pupils.

Using a blockmodel we can study three parallel Bernoulli graphs having three different link probabilities: the probability of contacts among boys, the probability of contacts among girls, and the probability of contacts between boys and girls. Of course, we can partition the set of actors into an arbitrary number of groups, provided we believe that certain characteristics of the actors affect the pattern of links.

**Structural Equivalence Model**

The third model presented here is based on structural equivalence, a deterministic concept originally introduced by social scientists. Two nodes are structurally equivalent, loosely speaking, if they have a similar pattern of links connecting them to other nodes. It is hypothesized that such equivalence occurs because these nodes share similar underlying properties. For example, we may find that there are two types of structurally equivalent groups when studying friendship among a group of students. This can then be connected to the fact that a friendship contact can possibly be explained by their living accommodations, i.e., friendship contacts that arise among students living in the same student house could be more frequent than for those living in different houses. Hence, structural equivalence can be used to explain the underlying mechanism which created the network.

**A Mixture Model**

To translate the deterministic structural equivalence into a stochastic world, a so-called mixture model was introduced into network analysis by Tom Snijders and myself. This model has also been adapted to deal with networks involving a large number of nodes, as for instance, the network in which nodes represent web sides and web pages communicating during the 2008 U.S. Presidential election. The mixture model is related to the blockmodel because in both we assume that the actors are partitioned into subgroups and that the occurrence of links between actors depends on the group to which the actors belong. However, unlike the setting in blockmodeling, where we have an a priori given partition of actors due to their known characteristics, in the mixture graph models we cannot observe the properties we assume. Such properties are often referred to as latent. By introducing latent variables into our model, we may improve the fit that the model provides for the data and, in addition, uncover some important but unobserved properties of actors.

To exemplify the mixture graph model we return to the analysis of the network of friendship contacts among students. One could include the students’ gender, if this information is available, and use the stochastic blockmodel to analyze the network.

But, maybe there are some unobserved characteristics of nodes which in fact affect the network. Perhaps some, for us unknown, property (or combination of known and unknown properties) governs the pattern of the network. To explore this hypothesis, we assume that the student population can be partitioned into, say, two subpopulations, A and B. The occurrence of contacts among students may then differ depending on whether they both belong to subpopulations A or B or belong to different subpopulations. Providing we can “reconstruct” the partition, we can now study three sub-networks: two describing contacts within each subpopulation and one describing contacts between the students from different subpopulations. Clearly, our choice of exactly two subpopulations is arbitrary. We could try three or four, but the choice of two reflects our hypothesis that the fact that the students are assigned to two student houses could play a role in the creation of friendship patterns. We assume that the proportion, \( P \), of all students belongs to subpopulation A, and the proportion \( Q = 1 - P \) belongs to subpopulation B, with these proportions being unknown. So how does the analysis proceed?

Our friendship network is recorded among a randomly selected group of 50 students from the overall student population. Nothing is known about students themselves, neither their gender nor their age nor previous education. Our model assumes that there is a latent property which partitions them in subpopulation A or B and, on average, \( 50P \) come from subpopulation A and \( 50Q \) from subpopulation B. Furthermore, we assume that there are three, possibly different, probabilities controlling the occurrence of contacts. We denote them: \( P_{aa} \) for contact between two students from subpopulation A, \( P_{bb} \) for contact between two students from B and \( P_{ab} \) contact between one student from A and one from B.

Using statistical methods far beyond the scope of this note we can now estimate our parameters: \( P, P_{aa}, P_{bb} \) and \( P_{ab} \). If we obtain, for example that \( P = 0.8, P_{aa} = 0.6, P_{bb} = 0.9 \) and \( P_{ab} = 0.2 \), there is a clear partition of students into two groups, one being roughly four times larger than the other. Moreover, the friendship contacts are much more likely to occur within subpopulations, in particular within the smaller population B. There is a much smaller probability that friendship is struck up between two students belonging to the two subpopulations. Several other properties of interest can now be expressed in terms of probability: the probability that a given student belongs to subpopulation A or B, or the probability that two students belong to the same subpopulation.

**The Markov Graph Model**

The last network model I want to describe was proposed by Ove Frank (together with David Strauss), one of the founders of statistical network analysis and previously professor at the Department of Statistics at Lund University. In this model, called the Markov Graph Model, we connect the probability of a given network to the number of occurrences of various types of structures in the network. In its simplest form, we introduce three parameters which allow us to make the probability dependent on how many of the following structures are found in an observed network: links, triangles (a triangle exists for given nodes A, B and C if there is a path A-B-C-A) and two-stars (nodes A,
B and C can, at most, form three two-stars depending on the presence of one or more of the following paths A–B–C, A–C–B, B–A–C. This model is very flexible; it provides the possibility of incorporating additional parameters connected to the number of link configurations of relevance for our data. It can also be applied to modeling directed networks.

Network Folklore

Finally a bit of folklore connected to networks. It involves Paul Erdős, who inspired his co-author Alfréd Rényi to come up with the following definition: “A mathematician is a device for turning coffee into theorems.” Erdős wrote around 1,400 mathematical articles in his lifetime, mostly together with co-authors. A so-called Erdős number was introduced to indicate the co-authorship connection of the researchers to this great mind. Paul Erdős has an Erdős number of zero. His 511 direct collaborators received Erdős number 1. The people who have collaborated with the collaborators (but not with Erdős himself) have an Erdős number of 2 (8,162 people as of 2007); those who have collaborated with people who have an Erdős number of 2 (but not with Erdős or anyone with an Erdős number of 1) have an Erdős number of 3, and so forth. A person with no such coauthor ship connection to Erdős has an Erdős of number of infinity.

One way to describe an Erdős number could be to construct an imaginary network of all world scientists with links drawn between every pair of authors who co-wrote a scientific paper. Hence an Erdős number is the length of shortest path from Erdős to any given scientists in the network.

Additional reading
The Globalization of Higher Education and Research: Some Notes on Research at the Research Policy Institute

When science policy was labeled a dedicated policy area in the mid 20th century, the goal was to steer science for various societal purposes. Science policy studies emerged in an era of untamed optimism of the virtues of tamed science – science could and should be used for productive purposes, most such purposes that were devised by the societal elites in politics, industry and – often most prominently – in defense.

Step by step, this instrumentalism has been deconstructed, and superseded by a “science critique” that takes no scientific claims for granted and that tends to view science as “politics with other means”. Somewhat paradoxically, this dethronement of science has been paralleled by a new dawn of instrumental perspectives on science and technology, times time in the shape of innovation systems studies, where science is viewed as a productive element in that perpetual search for new combinations of knowledge, production and markets called “innovation”.

Something is obviously missing here, and that something is a perspective where knowledge may be seen as a productive asset in society, and at the same time a contested resource where multiple interests compete not only over claims to truthfulness, validity and utility, but also over the direction of the use of knowledge in society. This messy state of knowledge in today’s society is at the forefront of activities at the Research Policy Institute.

Knowledge claims do not appear out of the blue. “Who says what” is still a central issue of contestation. In our work, we explore the mechanisms for determining who will be allowed to speak about controversial issues like environmental pollution, GMOs, global security, etc. We also study controversies around the production of knowledge, how universities and other research organizations are governed, how money is allocated to different forms of knowledge production (small-scale, collective, humanistic or scientific, etc.). We study how different interests compete over the direction of knowledge production, and how the seemingly timeless nature of the university has been managed under such different framework conditions like socialism, capitalism, state bureaucracy and “new public management”. We do it with a keen understanding of the contradictory tendencies of global convergence and local divergence, where some ideals become increasingly global (participation, publication, quality assessment), whereas others are locally contingent (innovation and utility, part of strategic planning and ranking exercises).

One particularly important field for us is the connection between higher education institutions and socio-economic development. This is dealt with through educational collaboration, currently with the Vietnamese government and the National University in Hanoi on a master’s program in science and technology governance. It is also the subject of several research projects and of the institute’s prestigious UNESCO chair in research management and innovation systems, held by Merle Jacob. Her work will be discussed in more detail here.

The new framing of HER (Higher Education and Research) in knowledge society discourse provides the opportunity for developing countries in general and those on the African continent in particular to pursue a long articulated desire, to create and sustain HER systems that are oriented towards meeting the agenda of local economic development. This opportunity stems from the
now accepted dogma that higher education and research have an important innovation obligation, the so-called third mission of the university.

Science and technology capability has once again become the focus of attention in developed as well as in developing countries. The knowledge society approach has had qualitative implications for the way in which countries pursue economic development planning. One of the more significant consequences has been the attempts to integrate higher education and research systems into macro economic policies for stimulating technological renewal (research and innovation policy). Research and innovation policy differs radically from previous generations of science and technology policy in three key respects that resonate well with the needs of low and middle income countries. These are that it: (i) emphasizes the need for universities and other public research providers to pursue research agendas that are anchored in the needs of the society which they inhabit (ii) promotes public-private partnerships as a key mechanism for achieving linkages between the economy and higher education and research and (iii) embraces a system perspective. The latter has proven challenging since it brought into sharp focus the need for policymakers to understand the prerequisites and context in which policies for innovation are being implemented. The connection between higher education and research on the one hand and innovation on the other is a critical linkage about which there is little knowledge in developed or developing countries. A perusal of the innovation agencies and research councils in OECD countries would reveal that one of the priorities is strengthening the knowledge base for understanding the dynamics of innovation systems. Similarly, developing countries have a need to understand the dynamics of restructuring their fledgling higher education and research systems if they are to be able to create efficient policies for putting research to work for development. Aid and development agencies such as Sida would also need to develop this capacity if they are to be partners in the development dialogue.

System Knowledge is Critical
Although the above described turn in research and innovation policy provides new opportunities for developing countries to achieve their need to design policies that are both state of the art and relevant to their contexts, the ability to do so is dependent on thorough system knowledge.

The focus of professor Jacob’s work is on understanding the connection between higher education and research on the one hand and innovation systems on the other by focusing on two key issues: What kinds of mechanisms could be used for promoting linkages between education and research and innovation in developing economies and what models of university management and governance can facilitate the integration of them.

To conclude, the field of science policy studies straddles many of the traditional boundaries of the university and of the knowledge production landscape: it draws on the understanding of science and its methods and practices, but it also includes an understanding of how the political system frames and controls knowledge and, in its extension, how it makes use of knowledge (policy for science and science for policy). With the growing importance of non-governmental organizations for the power distribution in society, it is natural to employ a focus of how their knowledge bases and how they make use of knowledge in their operations. Knowledge constitutes an important part of contemporary economic activity (sometimes labeled a “global knowledge economy”) and it is therefore of significance to understand how knowledge is deployed within and between firms. Making use of knowledge is a key element in global political relations in our security-obsessed era, where the capacity to access, elicit and interpret information is viewed as a critical resource to combat mounting security threats. While knowledge is seen as a critical resource to attain security, development and well-being, its forms and function will become increasingly controversial and subject to critical debates in society.
This article discusses microlending and ways for you as an investor to potentially profit from extending very small, so-called, microloans to poor people in poor countries. The article is not about another class of microloans, so-called SMS-loans, to rich kids in rich countries. These loans are also often labeled microloans even though the difference between them and the original microloan-type is significant.

While SMS-loans typically cater to cash-stripped teenagers who desperately want a new pair of jeans for the next party, or something similar, traditional microloans are usually for productive purposes, such as a micro-entrepreneur in India borrowing to buy a bicycle to set up a small bicycle-taxi business.

This article is also about the commercialization of the microcredit market. That is, the commercialization of the process of providing poor people in poor countries with small loans for productive purposes. The article is about how, and why, investors like you and me could contribute to this development by temporarily channeling our savings to micro-entrepreneurs through microbanks, hopefully doing well in the process.

Microfinance, generally, deals with the provision of small-scale financial services to poor and low-income people. The size of the commitment, whether it is a loan, an insurance policy or a savings account, is often very small, perhaps SEK 500, and it is typically provided by local so-called microbanks. These institutions have traditionally worked on a not-for-profit basis and their goal is simply to serve as “banks for the poor”. By providing credit and other financial services to micro-entrepreneurs in poor areas not served by regular banks these microbanks try to unlock the entrepreneurial spirit of people in unbanked areas of the world.

Despite the encouraging fact that microbanks already reach 100 million clients world-wide this amount is still just a drop in the bucket. The World Bank has estimated that more than 90% of the total demand for microfinance services remains untapped! And if we look solely at microcredit the annual global microloan volumes are growing very fast from the currently estimated SEK 300 billion. Not-for-profit initiatives have not been able to meet the total demand and that’s where the commercialization of microlending enters the stage. By letting profit-oriented institutions enter an area that is still dominated largely by not-for-profit institutions one is more likely to raise the funds necessary to meet the huge demand. Moreover, such commercialization is also considered likely to benefit the micro-borrower by providing loans with longer maturities and by providing more diversified funding sources.

What’s in it for Me?
Now, why should you as an ordinary retirement plan saver care about microlending? Why should you as an investor bother with lending SEK 1000 to a poor woman (the majority of all micro-borrowers are women) in an urban Nairobi slum or in the countryside of Namibia? Why should you withdraw some of your money from your ordinary bank account and transfer them to
microbanks servicing poor micro-clients in Bolivia? Why should you sell one or two of your blue-chip stocks and replace them with debt (or equity) in microbanks or micro-ventures? Or more generally, why should commercial microloans be treated just like any other “normal” financial asset?

In fact, there are many compelling reasons why the extension of tiny loans to micro-borrowers should appeal to the ordinary Swedish pension saver:

1. **The size of the market.** As an investor you want to choose from a wide palette of different assets and you want to be able to diversify across regions and industries. It is estimated that close to three billion people around the world lack access to proper financial services. It is also estimated that there are around 500 million micro-entrepreneurs across the globe. Needless to say, that creates a significant platform of potential micro-borrowers for you and me in the rich world to serve. And it opens up a market large enough to attract the middle-hands required to actually channel the funds to where they are needed. Regardless of what country, region or industry you believe in there is likely to be a choice for you. The significant size of the market also lends itself to diversification and as a result there is no need for you as an investor to put all your eggs in the same basket.

2. **The potentially high returns.** As an investor you want as high returns as possible without taking too much risk. Micro-lending, like most other investments, is of course subject to all sorts of risks. However, the returns from lending to micro-borrowers, even when risk-adjusted, are likely to be higher than the returns from lending to traditional borrowers such as banks and governments. A small farmer in Peru or a young entrepreneur in Djakarta typically generates a much higher return on his/her invested capital than a typical entrepreneur in Sweden, Denmark or any other advanced economy. As a result, many of the micro-entrepreneurs can afford to pay high interest rates on their loans. Studies have shown that micro-banks, despite charging as high annual interest rates as 40%, are able to significantly undercut local “loan sharks” and money lenders. And, based on past performance, the odds of seeing your money again are quite high. Historically, more than 95% of the micro-borrowers have actually paid back their loans.

3. **The low correlation with other investments.** As an investor you want to diversify and for diversification to work the assets in your investment portfolio have to be fairly uncorrelated. There are reasons to believe that microloan returns show a very low correlation with the returns from traditional assets. If you think about it, why would the success of a small farmer in, say, rural Laos or Mali, be related in any meaningful way to the swings in the Norwegian stock market or to the Swedish repo rate? Or why would the daily P/L (profits and losses) of a rickshaw driver in the slums of Bombay be affected by the movements in the Swedish currency? The answer is most likely that they are not! The swings in the values of your and my other investments are probably more or less independent of the swings in the returns to the microloans. In the words of the financial economist the microloan portfolio could therefore serve as a natural hedge. And in a world where most other asset classes tend to move increasingly in tandem this is not a minor feat.

“**But the Microloans are too Small for Me**”

Some initial steps towards commercialization have already been taken by the microfinance industry. One of the more important examples is the range of commercial microcredit funds that have been launched over the last couple of years. These funds typically pool and invest your money in debt and equity instruments issued by microbanks that in turn extend the actual microcredits to the micro-entrepreneurs.

A related innovation that is still pretty much in its infancy is securitization of microloans. Securitization is a fancy word meaning “the creation of homogeneous tradable securities from large pools of otherwise heterogeneous non-tradable loans”. In a typical microloan securitization the Bangladeshi microbank, or
perhaps a specialized local Swedish bank or financial intermediary, serves as the middle-hand between you, the investor, and the Bangladeshi street hawkers, the borrowers, by channeling both the risk and the return of the pooled loans in the shape of well-defined standardized securities that you can include in your investment portfolio. The middle-hand simply pools together a large number of small microloans and creates assets that are backed by the actual microloans (they are so-called asset-backed securities) where maturities, risk-levels etc. are chosen to suit the preferences of the investor. In other words, even though the individual microloans might look too small and too “exotic” for you, the microloan-backed securities created by the middle-hand look just like any other asset in your investment portfolio.

Now, if the assets created through the securitization process described above still do not suit you, perhaps since they still seem too risky or since you do not trust that the middle-hand actually chooses and surveys the underlying microloans carefully enough, there is still the possibility that some even more elaborate innovations in an area called structured finance could help you out. In a traditional securitization the middle-hand creates one kind, and one kind only, of asset-backed securities. The securitization can, however, alternatively be structured to produce several different asset-backed securities, so-called tranches, where some assets are more risky than other. The riskier securities will act as a buffer for the less risky securities by taking the first hit, so to say, in the case of non-performing microloans and the buyer of the riskier securities will of course be compensated through a higher (expected) return. Interestingly, among all the nice features of the trancheing one particularly important feature is the possibility it gives to the middle-hand of convincing the investor (i.e. you) about its genuine effort in choosing underlying microloans of high quality. By keeping some of the riskier tranches on its own balance sheet, the middle-hand is able to convince you that it is not simply trying to offload its bad loans, the so-called “lemons”, to you! To sum up, techniques borrowed from structured finance could possibly solve the information asymmetry problems associated with investing in tiny microloans in countries world-wide.

Let’s Conclude

Microlending should obviously appeal to any investor who wants to contribute to the fight against poverty. Importantly, however, microlending should also appeal to any rational investor who just wants a decent return on his or her investments. The idea is that by targeting the micro-entrepreneur directly, avoiding corrupt governmental structures or inefficient cultural traditions, microlending could be a way for the investor to do well by doing good. While the micro-entrepreneur gets access to abundant financing on better terms than he or she would otherwise get, you as an investor get a high risk-adjusted return on your investment.

One particularly promising avenue for the future could be the securitization of microloans. Even though securitization, asset-backed securities, sub-prime mortgage-backed securities, collateralized debt obligations and the plethora of structured finance products that were invented before the financial crisis admittedly are looked upon with skepticism by many investors today it is important to realize that many of these products err not in their inherent design but rather in their use. So, if we are careful when we migrate (some of) these innovations into the field of microfinance it is the belief of this author that most of the problems that we saw in the main-stream financial system during the recent financial crisis could be avoided. Not the least the information asymmetry problems so detrimental to advances in financial development.

Of course, the growth path of the commercial microcredit market is unlikely to be a straight one and most likely there will be setbacks along the way. The tendency for bubbles to appear in most financial markets should not be ignored and the mentioned inherent problems of information asymmetries and other incentive problems have to be acknowledged and treated as vigorously as possible. Sufficient competition among the microbanks needs to be fostered to rule out market abuse. It is also important to regulate the microfinance industry properly and to assure that lenders, borrowers and intermediaries all profit from the initiative. Mission drift, where the poorest of the poor are left behind, should also be avoided, or at least acknowledged. And in the end, even if all these provisions are fulfilled, the author is of course not naïve enough to claim that microfinance is a panacea for all mankind’s woes. But it could perhaps be one of many needed tools in the tool box against poverty!
Substantial migration flows across political borders are not a recent phenomenon. While mass migration flows from several European countries to North America characterized the latter half of the 19th century, numerous European welfare states have instead become countries of immigration since the end of the Second World War. As a result, many of the wealthiest Western countries are today characterized by sizeable non-native populations. Compared to a country traditionally viewed as a country of immigration like the United States, Sweden has since over a decade hosted a share of foreign born that equals the American, in 2008 amounting to 14 percent.

While the early-arriving cohorts of labor migrants to Sweden enjoyed very favorable labor market outcomes, changes in the labor market structure as well as the composition of immigration have caused immigrants in Sweden to experience a substantial disadvantage. More specifically, the immigrant labor market disadvantage that has emerged since the late 1970s is illustrated by several indicators, such as unemployment, earnings and occupational attainment. An equally striking pattern from previous research is that the disadvantage is closely linked to the individual’s country of origin, suggesting the existence of factors determined already prior to migration that influence the individual’s outcome.

The thesis Immigrant Careers: Why Country of Origin Matters consists of four original research chapters, all examining the labor market outcomes of a population of natives and immigrants in Sweden from 1968 and until 2001. As indicated by the title, the specific aim of the thesis is to improve the understanding regarding why country of origin matters, using individual-level register data. The motivation of the thesis originates from previous research, which consistently shows that the immigrant’s labor market outcome is strongly linked to their country of origin. A range of hypotheses regarding why this is the case have, however, remained essentially untested using empirical data. By exploiting unique information relating to the individual’s labor market relevant characteristics that are determined prior to migration, the thesis is able to examine the influence of a few such mechanisms on the immigrant’s post-migration labor market career in Sweden.

Pre- to Post Migration Mobility of Immigrants to Sweden 1970-1990 – A Panel Data Sample Selection Approach

The first piece of original research of the dissertation takes as a point of departure the hypothesis that many immigrants fail to obtain an occupation similar to the one they enjoyed prior to migration. The chapter analyzes roughly 3,000 immigrants from seven different countries of origin, exploring the transition from the labor market in their country of origin to the Swedish one. Using information on the individual’s occupation, the chapter examines the change in status when comparing the last occupation prior to migration with the first obtained after arrival in Sweden.
More specifically, this is done using an occupational classification, the International Socio Economic Index. The classification broadly measures socioeconomic status by gauging differences in the typical education and earnings potential of occupations, and is intended to be useful in cross-country comparisons.

The individual’s occupation prior to arriving in Sweden is obtained from the records of the Swedish immigration authorities, representing a truly unique feature of the data. Post-migration occupation is obtained from the censuses, undertaken every five years between 1970 and 1990, thereby setting the boundaries for when the individual’s post-migration occupation can be observed. In order to account for the risk that obtaining an occupation subsequent to migration is a non-random process and likely to be partly driven by unobserved characteristics, the analysis applies an econometric method aiming to cancel out any such influence. More specifically, the chapter analyzes the data by employing a “two-step sample selection estimation method”, specifically designed to account for the problem of non-random selection in a panel data setting.

The empirical contributions of the chapter pertain to extending the study of a highly interesting segment of the immigrant’s labor market career to a previously unstudied time period, using Swedish data. Furthermore, the influence of the region of origin effect is estimated with better precision due to the ability to control for the individual’s language skills as well as labor market experience obtained prior to migration.

Previous research has typically estimated the influence of pre-migration labor market experience that is measured with considerable imprecision. An approximation of the individual’s labor market experience may be close to accurate for male labor migrants, having migrated voluntarily and likely to have enjoyed an uninterrupted pre-migration career. This is, arguably, less likely to be the case for refugees. The chapter instead uses the immigrant’s self-reported actual labor market experience, estimating its influence on the process determining employment as well as on the occupational status subsequent to migration. The results consistently suggest labor market experience obtained prior to migration as irrelevant in determining employment, regardless of how its influence is modeled. Focusing instead on the status of the occupation obtained in Sweden, highly-skilled immigrants are observed to enjoy a statistically significant benefit from country of origin labor market experience. This effect remains robust across a range of model specifications, indicating highly-skilled immigrants as comparatively more able at signaling necessary skills obtained on-the-job, complementary to formal human capital.

High-skill occupations are typically associated with the performance of tasks characterized by a considerable extent of theoretical skills. Furthermore, the situation at the work place should place a greater emphasis on team work in a flatter organizational structure. As a result, high-skill occupations were hypothesized to rely more extensively on destination country specific informal skills, such as language. The results indeed suggest differences in terms of the status of the occupation obtained after migration between immigrants depending on their language skills. The importance of knowledge of a language closely related to Swedish increases with the pre-migration occupation’s skill level, consistent with the a priori expectations. Among immigrants in low-skill occupations prior to migration, no advantage in the transition to the Swedish labor market can be observed for individuals with a closer linguistic distance to Sweden. This suggests that employers for low-skill jobs are placing a limited focus on linguistic skills for eligibility for employment. Among immigrants in high-skill occupations prior to migration, the influence of language skills is, however, far from negligible. Particularly regarding the transition to a post-migration occupation, predicted outcomes suggest a substantial advantage for immigrants familiar with a language that is closely related to the Swedish.

An empirical observation from contemporary Western countries is the over-representation of immigrants in disadvantaged positions in the labor market. The chapter examines a period of time when this disadvantage was emerging, parallel with a dramatically changing labor market structure. More specifically, the chapter examines the relevance of a glass ceiling in illustrating immigrants’ exclusion from the most elevated positions in the labor market, primarily explained by demand side factors. In the chapter, such an exclusion is examined in terms of the probability of upward mobility into higher status occupations, where a consistent native male advantage theoretically is believed to be most accentuated for mobility into high status occupations.

The glass ceiling is examined by analyzing career changes, measured as improvements in occupational status, according to the International Socio-Economic Index. The data allows distinguishing between career changes into occupations in the public, private service or private manufacturing sector, using industrial classification data. The chapter examines 70,000 natives and immigrants in Sweden between 1970 and 1990, with the main contribution being that it delves deeper into how the labor market sector-specific opportunities for upward mobility depends on linguistic distance, formal education and sex. While immigrants to a varying extent are observed to be disadvantaged in all three sectors, the overall pattern clearly does not comply with a theoretically orthodox representation of a glass ceiling. Instead, the most common situation seems to be represented by the most substantial real differences in career opportunities between native males and immigrants at low-status origins.

The private service sector, characterized by a comparatively large share of high-status occupations, becomes the labor market sector that employs the largest share of the employed population during the time period examined in the paper. Ocular inspection of the data furthermore indicated the sector as characterized by the most evident pattern of career opportunities according to linguistic distance. The results from the econometric analysis, however, show an immigrant disadvantage that is more or less consistent across occupational status origins. This suggests that a given immigrant group is about equally disadvantaged in advancing past a position in either the lower or the upper part of the occupational hierarchy. An explanation for such a pattern could be that private service occupations regardless of status are associated with demands for destination country specific skills. Thus, regardless of whether an individual applies for a job as a cashier, bank teller or financial analyst, knowing the Swedish language represents a universal prerequisite.

From the results, a general immigrant and female disadvantage in attaining upward mobility into the private manufacturing sector also emerges. The disadvantage, however, suggests greater disadvantages at low- and medium-high occupational status origins, suggesting these groups as being particularly disadvantaged in becoming recruited for medium-level and management positions. Such results can tentatively be understood more easily while considering the over time shrinking private manufacturing sector, combined with an increasingly large share of high-skill occupations. To the extent that management positions also within this sector are associated with high demands on destination-country specific skills, this could support the increasing disadvantage according to linguistic distance. Furthermore, the sector’s male dominance also suggests a structural disadvantage for women. Despite the sector being characterized as comparati-
vely low-skill, the labor market changes occurring over time also affected the organization of work in the private manufacturing sector, introducing a flatter organizational structure. Hence, a greater emphasis on team work has also come to characterize low-skilled jobs, regardless of sector. As a result, also positions further down in the hierarchy may have become increasingly inaccessible for immigrants, thus explaining their disadvantage also at lower status origins.

The public sector emerges as the overall least disadvantageous sector for the immigrant, consistent with the expectations regarding the sector-specific demand mechanisms. Characterized by a substantial growth over time, particularly in terms of high-status occupations, the public sector was not expected to exclude immigrants from high-status positions to the same extent. More specifically, a greater reliance on formal recruitment methods as well as a generally more transparent employment process could result in immigrants enjoying a similar access to career opportunities in the public sector. The results are consistent with such a situation, as several immigrant groups actually experience greater probabilities of upward mobility into occupations in the public sector than does the native male. The results suggest immigrants’ advantage as most accentuated from the lowest status origins, indicating mobility into mid-status occupations within the public sector as a particularly common destination in the Swedish labor market. Also at higher status origins, the results confirm that the situation enjoyed by immigrants is considerably more favorable than in the other sectors. Despite the public sector being a comparatively favorable destination for immigrants in general, individuals with the greatest linguistic distance – typically non-European immigrants - are still observed to be disadvantaged albeit to a comparatively lesser extent.

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**Post-Migration Human Capital Investments and Immigrants’ Income Assimilation in Sweden, 1983-2001**

The chapter examines the income assimilation process of a small but well-defined sample of formally high-skilled immigrants to Sweden. Using information on occupation and formal education relating to the immigrant’s pre-migration experience, the chapter distinguishes between the income attainment of immigrants with formal degrees belonging to four different educational types. More specifically, 678 immigrants with advanced formal skills are examined, all of whom have their pre-migration degree within the educational types Health Care, Science and Technology, Education and Teaching and Social and Computer Science. Apart from examining their differing income assimilation trajectories, the chapter attempts to identify formal post-migration human capital investments, primarily done using information on the receipt of student assistance.

The sample selected for the chapter is of particular interest, due to their endowment of advanced formal skills, potentially of considerable use in the Swedish labor market. The chapter suggests a story that generally confirms immigrants’ poor opportunities to achieve income assimilation, consistent with findings from previous research. This is done by exploiting longitudinal data and individual fixed effect regression technique to cancel out the potential influence from ability bias.

The results support the bleak prospects for income assimilation among formally high-skilled immigrants as also proposed by previous research. With a mean income amounting to between 50 and 70 percent of a comparable native, the results also suggest substantial differences in the applicability of various types of skills in the Swedish labor market. Despite being an educational
type associated with occupations with only moderate benchmark incomes, immigrants with advanced degrees within Education and Teaching are observed to be the least likely to attain income assimilation. This would suggest this type of skills as associated with a limited applicability in the Swedish labor market. The opposite is represented by immigrants whose formal skills belong to the educational type Health Care, including nurses, physicians and veterinarians, enjoying comparatively favorable outcomes.

There is argued to be evidence of the anecdotal suggestions from other research that the typical immigrant only becomes exposed and encouraged to making any formal human capital investments after having failed in their initial attempt to assimilate into the labor market. Furthermore, if the immigrant’s intention is to return to the country of origin as soon as the opportunity presents itself, this is likely to diminish any intention to transfer their formal human capital to the Swedish labor market. Therefore, the most able immigrants who manage to gain a foothold in the Swedish labor market rapidly are less likely to consider or even be introduced to the option of investing in Swedish schooling.

Directing a particular focus towards netting out the influence of ability bias on the estimated effect of investing in relevant Swedish schooling subsequent to migration, parameter estimates suggest this as a highly beneficial strategy. The results show a substantial income premium associated with formally investing in Swedish education among individuals belonging to all educational types. From a policy perspective, efforts aiming towards encouraging immigrants to transfer their advanced formal degrees to become useful on the Swedish labor market should therefore clearly be a priority. While acknowledging the limited size of the sample, this chapter provides numerous indications regarding the mechanisms determining immigrants’ labor market outcomes while focusing on the utility of various types of formal skills.


There exists a growing empirical literature providing support for the lasting influence of health conditions experienced during the first year of life. In numerous contexts, empirical research has established a link between early-life conditions and later life health and socioeconomic status. Furthermore, all three parameters - early-life conditions, later life health and socioeconomic status - seem intimately related. As a result, a direct as well as indirect link between an individual’s early-life conditions and subsequent labor market experience has been indicated as a plausible causal mechanism in explaining differences in outcomes that cannot be explained by traditional models.

The chapter examines the influence of the health conditions to which the individual was exposed during infancy on their adulthood income attainment. The individual’s income is observed in a consistent age-range, between the ages 32 and 36. A major difficulty associated with establishing such a link is however to isolate the existence of a causal effect. First, when examining adulthood outcomes, the time elapsed between cause and effect naturally makes any model vulnerable to the influence of a range of confounding factors. Furthermore, the results may be sensitive to issues of selection, where individuals born under especially unfavorable circumstances may share a set of unobservable characteristics driving their effect.

In order to solve such problems, the chapter examines a sample of biological siblings and exploits “fixed effect modeling”, canceling out the influence of characteristics shared within the family. About 11,200 biological siblings were identified, from a subset of 12 different countries of origin, conditional on accurate data on early-life conditions – measured as the infant mortality rate – for the birth cohort in question.

A contribution of the chapter is that it examines a research problem which previously has not been examined in Sweden during the time period in question, using the aforementioned econometric modeling. Measuring early-life conditions using the infant mortality rate, another advantage of the findings pertain to the individual’s exposure being exogenously determined and also exposing large segments of – if not the entire – population of a given geographical area. The results consistently suggest variation in exposure to disease load as exercising a significant influence on the predicted adulthood income. While typical differences between the early-life conditions experienced by individuals from the same family typically are very small, the results nevertheless suggest an economically significant influence.

While the measurement of early-life conditions is believed to be exogenous and essentially permeating the entire population, previous research has indicated varying degrees of vulnerability to health shocks across socioeconomic status levels. The modeling is therefore extended to examine to what extent the influence from exposure to early-life conditions varies depending on the resources available to the parents. The results suggest the influence of exposure to early-life conditions as associated with the greatest effect on the predicted adulthood income among children in families with the least resources. This suggests exposure to adverse conditions among children within such families as leading to rather substantial differences in their later life labor market outcomes. The results also indicate the influence of exposure to early-life conditions as decreasing with the parents’ increasing socioeconomic status.

The existence of a socioeconomic gradient in the influence of early-life conditions strongly suggests that parents with a lot of resources appear able to redistribute resources among the siblings. As a result, the effect of the early-life conditions to which the less fortunate sibling was exposed may be at least partly offset by parental intervention. More specifically, better educated parents are more likely to possess knowledge regarding health care practices, nutrition and care. Despite the assumption that the exposure to variations in disease load affects the entire population, it is not impossible that differences in resources also potentially may affect a parent’s opportunities of partially or completely shielding the child from being exposed. While impossible to observe which explanation is correct, both would arguably present the observed pattern of early-life influence on later life labor market outcomes.