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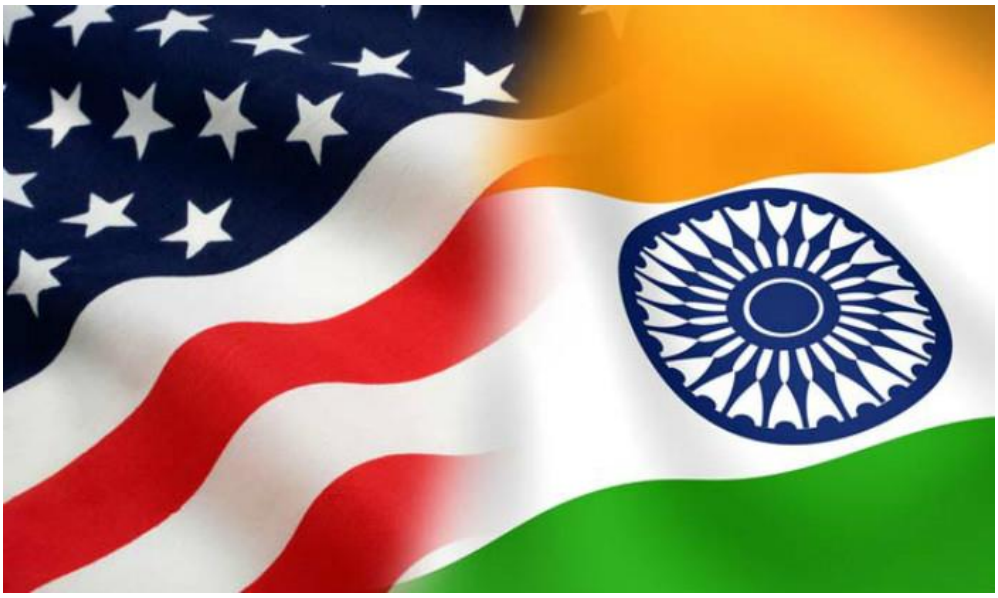
Indian Inventor Mobility and the Importance of Ethnic Community



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Abstract

Human asset mobility represents a field that has been extensively studied in the economic literature, yet there are some aspects of such discipline that deserve a further analysis. In particular, this study aims at analyzing the mobility patterns of Indian inventors in the semiconductor industry, with regard to the situation in California and in the other states. Indians in the US possess some peculiar characteristics that make them suitable for the purposes of this study. Indeed, they are very well educated, they have on average high academic degrees and also seem to have the highest entrepreneurial ambitions among immigrants, according to a vast body of literature. California instead, is the reference point of this analysis, since it represents the state in which the first ethnic associations began to arise. These associations, providers of resources and mentoring, enable Indian members to increase their chances of success in any field of activity. One of the most important association is represented by "The Indus Entrepreneurs" (TiE), an association born in California in 1992, whose goal resides in the intention to foster entrepreneurship.

This study proposes itself to observe if the introduction of these types of institutions, and in particular TiE, has somehow influenced the mobility patterns of Indian inventors. Differences in the activity of new venture formation are therefore expected, especially in California, the State where TiE was born. Furthermore, this study intends to assess the individual performance differences characterizing Indian inventors in the mobility context. The results of this study partly meet the initial expectations. In fact, findings reveal higher mobility to startups in California than in other territories as well as various differences in the individual performances among Indian inventors.

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1. Introduction

Employees' interfirm mobility has always been a topic under the thorough analysis of a vast part of the economic literature, which has examined in depth all aspects of the issue. This study on Indian inventors' mobility responds to a need for a simultaneous exploration of both the human transfer phenomenon and the facts underlying the growing presence of ethnic associations. As other studies have tried to observe the differences in employee mobility after some change in the environment, this study aims at doing the same. However, while for example Marx, Strumsky, & Fleming (2009) examine the influence of changes in the legislation on individual mobility, this study analyzes the potential influence of ethnic associations on individual mobility, with a special eye on mobility to startups. What mainly differentiates the research of Marx et al. (2009) from this one is perhaps the exogenous characteristic of the variation under analysis. Yet, both studies draw a parallel between conditions preceding and following a watershed event.

This study however, introduces an additional component to be inspected, that is the relevance of being part of a community. Being a member of a community requires individuals to find the correct balance between rights and obligations, also taking into consideration ties binding members, which can be very strong, especially if the community shares some common roots. That is why it is necessary to deepen also these aspects when considering individuals part of strong associations.

1.1. Determinants of Indian Success in Silicon Valley

1.1.1. Immigration to the US

Silicon Valley's success is undoubtedly related, among other things, to the large amount of super skilled immigrants arrived in California at the end of the 20th century. The majority of them came from Asia, in particular from India and China after 1965. In this year, 1965, the US Congress passed

the Immigration and Nationality Act, which modified the rules regarding the limits of the number of immigrants per year, thereby triggering an intense flow of new migrations. This act, also known as the Hart-Celler Act, maintained limits in terms of immigrants per country of origin, however it suppressed quotas based on race and ancestry. Furthermore, it created some special categories of immigrants with priority in entering the USA, like, among others, specialized workers. The use of Visa H1-B in particular, enabled US employers to hire foreign specialized employees and hence favor a huge wave of high skilled immigrants. The coeval economic development of Silicon Valley meant also that large part of the new immigrants settled down in California. In the same way, the number of immigrants significantly increased also after the 1990 Immigration Act, which extended the amount of durable work-based visas.

Indian immigrants have always been one of the most represented group that reached the US over time. The very firsts came to America in 1820s, yet they were not many. Until 1965, the type of Indians arriving in the US had low skills, were uneducated and mainly farmers. After 1965, the number of Indians became larger and larger, characterized by high skilled individuals with good fluency in the English language, which favored a smooth integration into the society. In fact, thanks to their language competences, Indians will mainly establish themselves in companies dealing with software and business services (Saxenian, 1999). From 1980 to 2013, the Indian population in the US increased tenfold, approximatively doubling each decade and reaching 2.03 million individuals in 2013 (www.migrationpolicy.org).

Immigration in this vibrant region has been the object of many studies in recent years, mainly aiming at investigating the contribution provided by non-natives to the development of Silicon Valley. AnnaLee Saxenian, for example, is one of the researcher who mostly engaged in the study of immigration and the related economic activities in California at the end of the 20th century. She has intensively studied the characteristics of immigrant workers and entrepreneurs in Silicon Valley and, furthermore, she has followed the development of the ethnic networks spawn from these cultures.

In 1990, reference year for Saxenian's study, a quarter of the Silicon Valley working population was born abroad, value climbing to 30% if we consider high technology occupations. Needless to say that almost two-thirds of them is reported to have Asian origins (Saxenian, 1999). Among them, Indian immigrants, display excellent results with regard to educational attainments as well as working and entrepreneurial success. 32% of the Indian employees possess an advanced degree in Silicon Valley in 1990. Instead, if we consider the Indian employees working in high technology industries, the percentage rises to 55%. This fact is rather intriguing because the corresponding percentages of white employees barely reach the 11% in the former and 18% in the latter example, not only witnessing the clear importance of high academic results in the Indian culture, but also the innate predisposition to scientific studies, peculiarity that it is not a novelty for the literature.

However, Indians struggle to reach managerial positions within organizations. This issue, known as the "glass ceiling", hampers the rise of immigrants towards the management roles in the firms. Even though Indians have a higher formation compared to their native colleagues, the path that leads to career advancements seems to be extremely hard because of the preexistence of old networks dominated by white men who exclude and distrust Asians (Saxenian, 1999).

Today instead, when it comes to the role of Indian immigrants within organizations, things have radically changed. The "glass ceiling" problem does not seem to be an issue anymore. In most organizational contexts, India-born employees are able to progress very fast in their career, sometimes even faster than their white counterparts, especially in high technology industries. Nowadays, Indian Americans run highly innovative firms in Silicon Valley by holding the most prestigious roles in organizational charts. Just to cite two examples, Microsoft Corporation and Google Inc. have appointed as chief executive officer Satya Naryana Nadella and Sundar Pichai, respectively. These Indo-American men managed to become heads of two real "giants" in Silicon Valley, definitely two of the most innovative firms in the world. Silicon Valley is now dominated by the presence of Indian Americans, who have both acquired an excellent reputation as directors and unveiled their genetic talent for entrepreneurship.

From 1999 to 2012 the percentage of Indian-founded new ventures has risen from 7% to 15.5%, notwithstanding the low proportion of Indian employees in Silicon Valley, only 6% (www.firstpost.com). As shown by these data, the foundation of Indian immigrant startups has flourished in the last decade, despite a general negative trend affecting immigrant entrepreneurs. Vivek Wadha, an Indian American entrepreneur and academic, has found that the proportion of new ventures created by non-natives in Silicon Valley has dropped from 52.4% to 43.9% from 2005 to 2012, reversing the preexisting trend (www.readwrite.com). Wadha, by interviewing members of important companies and venture capitals in Silicon Valley, has come up with the conclusion that there should be policy changes in order to keep on fostering immigrants' entrepreneurial activity, like visa facilitation and extension for non-natives entrepreneurs. In his view, on the one hand, current visas have too many restrictions that might hinder potential entrepreneurs' projects; on the other hand, green cards (i.e. permanent residence permits) should be made more available for this type of high-skilled workers.

1.1.2 Entrepreneurial Spirit

Today's Indian success in Silicon Valley is, without any doubt, the result of the mental approach and perseverance proper of these (often young) entrepreneurs. The ability to create networks, to help each other and to gather into associations helped Indian entrepreneurs to develop an internal system of mutual assistance. Indians' propensity to engage in entrepreneurship has been analyzed since their massive arrival in 1965. In the '90s, it has been shown that Indians displayed a higher willingness to initiate a startup compared to other ethnicities. Saxenian, Motoyama, & Quan (2002) have analyzed the differences between Indians and Chinese regarding the entrepreneurial approaches and intentions. 60% of the Indians in their study have been involved in the formation of a startup versus the 32% of Chinese immigrants.

Following the same trend, Indian immigrants cultivate an attitude oriented to entrepreneurial projects in the long term, unlike Chinese, who do not plan to start a business on

their own as much as Indians do. According to Saxenian et al. (2002) the 74% of the Indian immigrants interviewed plan to start a business on their own on a full time basis, a proportion much higher than the Chinese one, set at 53%. An interesting fact about this collection of interviews and data is the willingness, both displayed by Indians and Chinese, to return one day to the country of origin. Almost half of the respondent (45% of Indians and 43% of Chinese) wishes to return to live in India and China in the future. The main reasons that push Indians to go back to India one day in the future are the ones connected to culture and family. The majority of the Indians interviewed proves to be somehow homesick, especially for what concerns daily lifestyle. Furthermore, a return back to India would be positive for family reunions and for children education. Last but not least, Indian immigrants would like to get back to India also to contribute to the social and economic development of their home country.

This highlights the fact that many immigrants have arrived in the US in order to fulfill esteem and self-actualization needs, because unable to achieve the same results in their country of origin. In India indeed, there are not the same working conditions and expectations as the ones we can find in America. The main problems impeding the realization of anyone's plans to start his own business in India reside in the impossibility to rely on the nation's infrastructures. Transportation, power and telecommunications turn out to be underdeveloped, making it difficult to start an entrepreneurial activity. A slow and inefficient bureaucracy, usually coupled together with detrimental and ineffective government regulations, also accompanies these negative issues. Other types of constraints prove to be the presence of domestic premature markets and insufficient business services. The contextual combination of these obstacles constitute enough barriers to deter Indians from founding a startup in their country of birth.

The rising number of Indian immigrants in the US in the last decades has contributed to the birth of several associations, which have the function to promote, assist and guide members in the development of their activities. Indians have proved to be very attached to domestic traditions as

well as people and colleagues sharing their same origins. Saxenian et al., (2002) have investigated the nationality of people working with startups' founders and they found out that Indians heavily rely on colleagues that share their same nationality. However, this tendency decreases as the number of employees increases, that is to say that the more people work for the Indian entrepreneur and the less people come from India, in percentage terms.

As any other immigrant in a foreign country, Indians have shown the tendency to gather together and form professional associations, designed to help members achieve success in any dimension of the world of work. Silicon Valley Indian Professionals Association (SIPA) was founded in 1991 with the initial aim of sharing the members' main concerns about the working environment. The idea started in 1987, but became an official association only four years later, when many Indian professionals expressed this need of aggregation. The association rapidly grew in size through the years, now indirectly reaching almost 30,000 professional and proposing itself as one of the largest Indian networks in which members can pursue personal enrichment and professional growth. Before SIPA, other Asian associations already existed, but were unable to make their members feel a sense of unity and common values, mainly because these associations had members from different Asian countries, often speaking different languages and dialects. Hence, the launch of association that gathered people from the same country of origin.

Another important association born in the 90's was The Indus Entrepreneurs (TiE), which was conceived as a fundamental reference point for all Indian immigrants willing to start their own business or simply help successful entrepreneurs extend their networks and acquaintances. Because of the importance of this association for Indian entrepreneurs in Silicon Valley, the description of TiE deserves a more in-depth analysis.

1.2. The Indus Entrepreneurs (TiE)

The Indus Entrepreneurs (TiE) is a not for profit organization founded in Silicon Valley in 1992, aiming at fostering entrepreneurship across the world. It was established by three successful Indian entrepreneurs: Suhas S. Patil, Kanwal Rekhi and Prabhu Goel, founders of Cirrus Logic, Excelan and Gateway Design Automation respectively. The idea to start this organization arose after some difficulties, faced by these entrepreneurs, in starting their own business alone. According to the three founders' previous experiences, it was very hard to be an entrepreneur before the birth of TiE. Every entrepreneur had to do everything on his own or counting only on the few personal contacts available. There was the lack of an organization or an institution, which could have provided some support to the new potential entrepreneurs at that time.

The main obstacles impeding a smooth development of a new venture could be identified in the solitude of entrepreneurs and in the diffidence of the Venture Capitals (VC). In fact, immigrant entrepreneurs struggled a lot to find any kind of support when founding a new firm, especially in the first phases. Moreover, VCs looked at these new immigrant entrepreneurs in a very skeptical way, most of the time not granting any sort of financing, due to the fact that there was an initial and widespread bias against all non-natives. The generation of this organization has thus permitted these neophytes to overcome such problems and to develop in this manner an association with the role of a guiding light into the business world.

As for the name of the organization, the decision to choose the adjective "Indus" and not "Indian" reflects the founders' willingness to welcome a larger group of ethnic entrepreneurs rather than exclusively Indians. This organization was imagined as a golden opportunity not only for Indian entrepreneurs, but also for immigrant entrepreneurs coming from Pakistan, Bangladesh or Nepal. Therefore, the initial idea was to identify the organization as a group of people characterized by the same origin, irrespective of the nationality "tout court" but, however, coming from a precise geographical area, South Asia in detail. Yet, despite this peculiarity, almost all members who joined

TiE in the first years were Indian, mainly because the other ethnic groups were scarce in number in the '90s in Silicon Valley. Today instead, TiE widely opens its doors to any kind of professional, regardless of the country of origin.

The success of this association has grown steadily over the years. Founded in 1992 in California, TiE has managed to increase the number of its chapters and members very fast across the globe. Suffice it to say that the participants in the annual conference of TiE Silicon Valley's chapter have augmented from over five hundred people in 1994, to nearly a thousand in 1999, to more than fourty-six hundred people in the expected conference in 2016 (http://sv.tie.org/event/tiecon-2016/). Today TiE consists of thirteen thousand members, of which twenty-five hundred charter members, spread among sixty-one chapters in eighteen different countries across the world.

The reasons why TiE has reached a large success reside in its internal philosophy, which aims at obtaining wealth creation through entrepreneurship. Not for nothing has TiE chosen the following maxim to create its personal motto: "Fostering Entrepreneurship Globally". Such aphorism condenses the spirit and the intentions of the organization, which permanently acts with an eye to the future. "*Dedicated to the virtuous cycle of wealth creation and giving back to the community, TiE's focus is on generating and nurturing our next generation of entrepreneurs*", this is indeed how the organization proposes itself in the business world (http://tie.org/about-us/).

The accomplishment of TiE's preset goals has occurred thanks to the various activity that the association promotes worldwide. TiE can count on hundreds of volunteers that help the organization to arrange meetings, workshops and events. The international prestige, broadly recognized by people's opinions, is guaranteed by the fact that such system encourages economic activities throughout the world, regardless of whether it operates in a developed or developing country, thus favoring commercial advancements both in flourishing and primitive areas.

So far, TiE succeeds in its mission by offering a huge variety of programs in its different chapters. As a result, many new promising ventures have entered the market in the last years, notably FlightCar and Openbucks, definitely TiE's best gems. The annual fee to be paid to be part of TiE's organization depends on the type of membership. Student and regular membership are relatively cheap, $100 and $150 respectively; however, people aiming at joining TiE as a charter member not only have to pay $1750, but they also need to be invited by other charter members already in the organization.

1.2.1. TiE's Pillars and Main Programs

The Indus Entrepreneurs is based on five important pillars, which summarize the main activities of the organization. These pillars are: mentoring, networking, education, incubating and funding.

Mentoring is probably the exercise that most of the initial members wanted by this organization. In fact, it is a great opportunity to listen to mentors and elicit their advices as well as their actions. The decision to launch mentoring programs reflects also the nature of Indians, characterized by a strong sense of collectivism compared to the other nationalities (House, Hanges, Javidan, Dorfman, & Gupta, 2004). Unlike non-Indians, Indians show a strong sense of belonging to their national culture and display an attitude oriented to mutual support and altruism. It is important to say that not all TiE chapters necessarily organize the same events or host the same programs, however the most successful initiative are reproduced in many chapters and countries.

The mentoring activities can be organized whether in groups or alone ("Mentor Connect" program), i.e. one-to-one with the personal mentor. Among such activities, there is "My Story Sessions", where experienced entrepreneurs share their own personal story with students and potential new entrepreneurs. "Mentor Match" is instead a program that runs on an online platform, allowing participants to join a large set of professionals and consequently share information and suggestions. This program helps people to keep in touch and it can also contribute to the building of solid bases for potential future collaborations among registered members. The main advantage

of this program lies in its structure, the aforementioned online platform. People can indeed browse the online system and look for the object of their interests, immediately finding the answers to their problems, thanks to the support of colleagues and mentors.

As people enter TiE, they become part of a large organization and, for this reason, part of a vast network from which every member can benefit. TiE hosts different types of individuals, ranging from academics, to aspiring entrepreneurs, to experts in different fields, who can all share information, chat and stay connected. TiE members have the possibility to sign up to a social network that includes all members and, in this way, they start accumulating contacts and expanding their own personal networks. Contacts, chat, sharing turn out to be easier and faster by the use of such social network, called “TiE Link”.

Education is fundamental for the organization, insofar TiE believes that all experiences and expertise acquired through the collaboration of the different professionals should be transmitted to the aspiring entrepreneurs and young professionals. The ways through which aspiring entrepreneurs can learn are various and also simple. One of them is “TiE Talks”, a set of videos in which serial entrepreneurs, experts and charter members explain and illustrate different themes dealing with the world of entrepreneurship. Listeners can learn many interesting things from these videos by simply staying comfortably at home.

TiE takes also care of tomorrow’s entrepreneurs that are now still attending high school. The program called “The Young Entrepreneurs” (TYE) addresses to the younger generations already interested in a potential future as entrepreneurs. TYE aims at providing insights regarding the role of entrepreneurs by presenting the main challenges of such profession. Students take classes, acquire new tools and eventually are divided into groups in order to develop and present their own business plan. The program is organized as a competitive game, where the winner for the best business plan in each chapter advances to the global final phase and competes for a $10000 final award. After the creation of this program in 2005 in Boston and its following success, TiE decided to

replicate the TYE program in other chapters across the world, arriving at today's twenty and more chapters executing TYE.

The equivalent program to TYE is called "TiE Institute", a program that aspires to the education of future entrepreneurs, this time regardless of their age. TiE Institute consists of both an online portal where students can benefit from different types of resources and of a course, generally lasting six weeks, in which experts and entrepreneurs share their knowledge with attendees and encourage them to participate in real life case studies. Lessons are interactive and allow aspiring entrepreneurs to acquire precious expertise, which they will be able to use in tomorrow's first phases of a venture creation.

Like TYE, TiE Institute includes the participation to a contest that represents a direct connection between entrepreneurs and investors. This contest is called TiEQuest and challenges potential entrepreneurs globally, with final rewards of 150000$ and $1 million in investments guaranteed by the sponsors. This competition is rather unique, since it gives the possibility to be supported by a TiE mentor, thanks to whom the participants will be able to adjust and improve their strategy, implemented to present their personal business ideas to venture capitalists, angel investors and sponsors at TiEQuest. TiE also offers various incubating and accelerating programs, which can vary depending on the chapter involved. For instance, some programs are proposed by TiE in almost every chapter of its organization, some others are unique because they are tailor-made for that specific geographical area.

One of the most interesting programs regarding incubators and accelerators is undoubtedly TiE LaunchPad. It is an accelerator promoted by TiE's Silicon Valley chapter, in which, during a period of five months, top TiE charter members help an exclusive and pre-selected group of entrepreneurs to confirm their business and prepare them for the funding stage. In such context, participants have the chance to connect with "la crème de la crème" of Silicon Valley's top tech executives. As for selection criteria, new ventures have to deal with the sale of their products to other businesses and

furthermore, substantial preference is given to startups that are located around Silicon Valley. If selected in the program, startups in TiE LaunchPad receive $50000 in convertible notes and have the possibility to enter TiE's huge network, in return of a 4% common equity program fee and the optional cost of $275 per month for a desk at TiE. Mentors, selected by entrepreneurs among TiE Silicon Valley's charter members, provide a deep support guaranteed by the one-to-one relationship. The incentives that push mentors to collaborate so intensively with entrepreneurs are numerous. First, part of the fee (0.25%) goes directly to the mentor. Second, the majority of the mentors are also investors of a fund that is used to put in place the entire program and also used to provide the aforementioned convertible notes to the entrepreneurs, thereby a smart way to align both mentors' and participants' interests. Third, part of the fund's return is given back to TiE and, last but not least, helping others is one of the main principle within the organization. The program consists of dedicated hours with the personal mentor oriented to the final validation of the business. The outcome of the program has to be a clear marketing strategy, a defined financial plan and all the other specifics that characterize a classic business. Mentors have the power to introduce entrepreneurs to a vast set of professionals who can further assist the entrepreneurs in the validation process. Special talks, meetings and contents are also available for TiE LaunchPad attendees and contribute to the collection of different important resources, opinions and point of views.

The last pillar characterizing TiE is funding, the ensemble of all practices that TiE offers to startups to receive any sort of financing. As for other initiatives, TiE provides a social platform (TiE Source) through which investors and entrepreneurs can arrange themselves for the details after the seal of a deal. More important is perhaps "TiE Angels", a program established by TiE, in which entrepreneurs seeking funding meet investors looking for profitable investments. In 2014, at the age of just three, TiE Angels has been included in the 20 top angel investment groups (https://www.cbinsights.com). Any entrepreneur, regardless of his eventual membership in TiE, can apply to this program and thus has the chance to find an angel investor ready to sustain his startup

economically. There are no fees for this program; however, the entrepreneurs have to pass an initial screening and a final meeting, before their idea is reputed to be viable and hence supportable. Conditional on acceptance is obviously the prevision regarding the product and the related market trend. Once the startup is deemed interesting for an angel investor, the latter usually invests between $100000 and $1.5 million in the former. Here there is no fund, therefore every angel investor decides individually whether to invest or not, basing himself on his personal considerations. This young program has acquired so much success in such a short time, that now it is replicated in lots of TiE's chapters.

1.2.2. Worldwide Activities

Apart from the previously mentioned programs that specifically recall TiE's cornerstone, the association performs other interesting initiatives across the world. TiEcon for example, is a two-day conference in fifteen different countries, gathering the top experts in entrepreneurship, luminaries, aspiring entrepreneurs and investors, all together in one place, discussing about the future and presenting the updated market trends. This is by far the biggest event of the year and gathers almost five thousand people once a year. It includes workshops, speed dates to extend networks and various meetings. TiE50 Award Program is instead an annual meeting organized to reward the best entrepreneurs and startups of the year. Even systems rewarding the best executives across the world's chapters exist within the organization, as well as many forms of competition among emerging startups in every chapter of the association.

The recent activities undertaken by TiE take a look at the future, without losing track of the extremely positive accomplishment obtained in its almost twenty-five years of history. Trends push the organization to focus on countries other than the US, like India for example, where the structures and infrastructures might not be yet efficient, but where TiE can count on an inestimable quality and quantity of human capital. Today, the main fields of analysis regard the concepts of big data and the Internet of Things (IoT), two emerging topics that are now widely studied. The "Billion

Dollar Baby" program helps the most interesting Indian startups to reach the enterprise value of $1 billion and, in order to do so, TiE brings them to the Silicon Valley to take advantage of the best economic conditions, incrementing in this way the relationship between different countries. However, TiE does not leave the other Indian startups out but, on the contrary, it helps them to develop in-house, through the improvement of the Indian local chapters and through an incessant boost of domestic programs. In Hyderabad for instance, new incubation facilities have been put in place, enabling the supervision of six startups at the time. Other intriguing actions are the seal of partnerships with important firms (Microsoft e.g.) and the start of entrepreneurial programs for Women exclusively.

Without any doubt, TiE is gaining increasingly prominence over the years in the entire world, thanks to the vast network of specialists and the quality of its intellectual capital. The decision to operate in under-developed countries to boost the flowering of the economic activity has been crucial for the association, not only because of the benefits it has created in country like India and Pakistan e.g., but also for the expansion of its personal reputation. All the operations that TiE undertakes have social significance and, at the end of the day, they have contributed to an estimated economic value creation of $200 billion worldwide.

TiE is symbol of entrepreneurship, but especially professionalism. Being part of TiE's network constitutes a solid reputational advantage in the eyes of many other professionals, as credibility plays a fundamental role in economic deals. Budding entrepreneurs have admitted that being part of an institution like TiE helped them to raise funding, mainly because of the credibility the TiE brand guarantees. In conclusion, starting as a small immigrant association in Silicon Valley, TiE has firstly succeeded in creating a vibrant environment in which it has been possible to nurture entrepreneurship and secondly, it has expanded itself globally with peremptory success. Above all, TiE has managed to avoid common mistakes proper of ethnic institution; namely, ethnic

organizations tend to rely too much on resources that have the same origins as the organization's roots.

Furthermore, the inclusion of members that have nothing to do with that specific culture has always been seen in a skeptical way by ethnic minorities, thereby entailing a closure towards new source of knowledge and hence strong limits to innovation. TiE instead, despite its ethnic peculiarities, has gathered members from every part of the world, regardless of the culture, religion or language. In this way, not only has TiE prevented the possibility to be stuck in its own culture, but it has also increased its intellectual capital determining today's success.

2. Literature Review

The literature existing to this day covers a wide array of topics regarding workers moving from one place to another. The dynamism characterizing recent past has also influenced workers mobility by offering more and more opportunities thanks to the rising quality of information and communication tools. Hence the growing number of employees bringing their talent to diverse organizations over time. The modernity of employee mobility is thus unquestioned and the progressive development of today's society contributes as well to the growth of such phenomenon.

However, there are regulations and norms that might affect employee mobility, constituting a barrier or a limitation to the transfer of human capital. These tools encompass every single formal or informal mechanism apt to guarantee the disclosure of delicate information and data. Therefore, the decision to implement such instruments highly influences firms' hiring practices.

Before going deeper into the features of employee mobility, it is thus interesting to examine how firms can prevent workers from revealing private information.

2.1. Trade Secret Protection

2.1.1. States Regulations

The protection of delicate information has always been a critical concern for firms, and this is even more the case at a time when, thanks to the sophisticated vehicles we dispose nowadays, data and facts can spread worldwide in the blink of an eye. Techniques set to protect valuable information can be quite a lot different in form and content, varying for example from classic patents to restrictive covenants. Employers usually use such tools to protect internal secrets and to avoid the diffusion of private knowledge, necessary actions to undertake when employees decide to move elsewhere. Indeed, employees possess knowledge and skills that inevitably derive from their past experience and that can thus endanger the employer's trade secrets when used in another employment (Lowry, 1988). In this context, the inevitable disclosure doctrine acquires a deep significance, establishing whether the owner of a trade secret can or cannot obtain a restraining order to avoid employees joining another firm or founding a startup, since employees will eventually disclose trade secrets, even if they do not intend to (Lowry, 1988).

However, rules and approaches greatly differ across countries and states, with the result that no unitary argument can be expounded. Hence, only a brief description of the US restrictive covenants will follow hereunder. First, this matter is regulated on a state basis in the US, i.e. each state follows its own regulation to resolve trade secrets disputes. Some states adhere to the inevitable disclosure doctrine (e.g. Arkansas, Delaware…), some states clearly go against it (California for example), some states do not have a clear stance and lastly some others have not ruled yet on the doctrine (Png & Samila, 2013). In general, when a state determines its position on the doctrine, then such position will generally be held also in the future, because case decisions are based on the court's precedents, in line with the so-called "*stare decisis*" principle (Hart, 2012). However, a sort of trend can be identified, i.e. the reasonableness of the restriction, a principle working for the majority of the states. According to this principle, the more restrictive the covenant

is, the less likely it is to be enforced by the court. In such sense, the duration, the geographic scope and the nature of the potential restricted activity represent factors that mostly influence the final judicial decision.

Anyway, as an overarching rule, trade secrets are safeguarded by courts, no matter state rules, as long as these are true secrets and not information available in the public domain (www.mayerbrown.com). Referring specifically to non-compete clauses, the aforementioned rule asserts that such clauses are valid for most US jurisdictions, as long as they are in line with the reasonableness of the restriction. In California and the minority of jurisdictions however, such clauses are not valid and consequently not enforceable (except for few cases), because they are believed to be against the state's public policy (www.mayerbrown.com).

The different orientation towards restrictive clauses has not only influenced employers and employees within organizations, but it has also shaped the economy and the growth of regions and states. Gilson (1999), for example, attributes Silicon Valley's entrepreneurial success to California's state policy, clearly in opposition to the enforceability of non-compete clauses. Other authors have analyzed the differences between these two kinds of environment (pro or against restrictive covenants) and have come up with interesting findings.

2.1.2. The Effects of Restrictive Covenants

The use of restrictive covenants, as already said, enables employers to retain valuable employees and impede their exit from the organization. Castellaneta, Conti, Kemeny, & Veloso (2015) have shown that Venture Capitalists (VCs) prefer to invest in environments where the law is in favor of the inevitable disclosure doctrine, because the result of legal actions regarding restrictive covenants will be in line with previous decisions, thus hampering the mobility of human capital in which VCs have invested in such environment. In the same way, non-local investors have higher stimuli (compared to local investors) in investing in environments where rules in favor of inevitable disclosure exist, because the problem of geographic distance can be mitigated by a more stable

environment (Castellaneta, Conti, Kemeny, et al., 2015). Garmaise (2009) has given another important evidence of the decreased mobility of executives in high enforcement jurisdictions. Furthermore, he has seen that executives have lower and more salary-based wages, because managers tend to have inferior tenure when not moving to other firms. In these jurisdictions, capital expenditures per employee are lower and are in line with a model in which enforceable non-competition agreements push firms to invest in their human capital, but do not encourage managers to invest in their own human capital (Garmaise, 2009).

Non-competition agreements contribute to the allocation of more resources for the R&D departments within firms, because investments are not going to be lost since talented employees have few chances of moving away from the firm. Hence, a greater propensity to invest in risky projects, resulting at the end of the day in either complete failures or breakthroughs and moreover in discoveries in areas far from the firm core know-how (Conti, 2013).

Starr (2015) confirms some of Garmaise's findings by showing that going from a non-enforcement to the highest enforcement environment leads to an increase in firm-sponsored trainings and a reduction in employee's wages. However, wages are raised in case of specific laws, coupling the enforceability of non-compete clauses together with extra bonuses for employees (Starr, 2015). Starr has also analyzed the relationship between the enforceability regime and both the creation and the life cycle of new ventures. He found out that the enforceability of covenants not to compete has a negative effect on within industry spinouts' (WSOs) entry rate, but no impact on non-within industry spinouts' (non-WSOs) entry rate. Moreover, WSOs tend to be larger, more likely to survive and faster to grow compared to non-WSOs in high enforceable environment. Non-compete enforceability also displays a "screening effect" on WSOs formation, resulting in founders' higher earnings (before the new venture formation) and thus discouraging low skilled employees from creating a WSO (Starr, Balasubramanian & Sakakibara, 2015). Starr has shown, in another separate study, how popular these non-compete clauses are in the US labor market, not only

encompassing engineering and computer professions, but also involving lower skilled occupations, like installation and repair for example. Consistent with the literature, Starr found that these covenants discourage employees to leave firms, but at the same time, such covenants are associated with longer tenures and more trainings. Covenants not to compete are rarely modified and renegotiated after that the contract has been signed; yet the acceptance of such clauses makes sure that employees will benefit from a higher wage growth (Starr, Bishara & Prescott, 2015).

From a financial point of view, firms tend to reduce their financial risks by adopting a more cautious capital structure when the state in which they operate rules in favor of the inevitable disclosure doctrine (Klasa et al., 2014).

In conclusion, some authors have proved the contradictory nature of the trade secret protection (Castellaneta, Conti, & Kacperczyk, 2015): on the one side, all actions undertaken to protect firms' valuable information guarantee a higher market value for the firm, because of rivals' impossibility to imitate. On the other side, the fact that the public does not know information about the firm entails riskier investments for potential buyers and hence inevitable discounted offers from the firm. In this perspective, the protection of firms' secrets can be debatable. However it has been shown that in industries where employees are more likely to move it is better to protect trade secrets, unlike high uncertain environments where such protection can cause negative effects for the firm (Castellaneta, Conti, & Kacperczyk, 2015).

2.2. Employee Mobility

2.2.1. Knowledge Transfer

A considerable part of the current literature analyzes employee mobility under an organizational perspective, that is to say regardless of the psychological motives and thoughts of the individuals but, on the contrary, considering the arising consequences for firms. Individuals still remain the basic unit of analysis, however greater attention has to be paid to the mechanisms affecting organizations

during and after employee mobility. Having said that, the four areas of investigation on which scholars have mainly focused themselves can be identified in learning by hiring, localization of knowledge, the effects on firms and the likelihoods of moving.

Firms' performances, among other things, are clearly dependent on their own interior resources and, furthermore, the quality of such resources, like knowledge for instance, can sustain a competitive advantage (Argote & Ingram, 2000). These two authors have defined the concept of knowledge as a "reservoir", a sort of know-how stock that is always available over time (Argote & Ingram, 2000, p. 153). They stated "Knowledge can be moved by moving the networks in which it is embedded" (Argote & Ingram, 2000, p. 156) thereby recognizing the important role of employees, sources of information, capabilities and networks in the acquisition of new knowledge. Despite possible difficulties that may arise in new contexts, employees' knowledge has proved to be very adaptive in new environments and thus, a hypothetical transfer of technologies and tasks without the contextual movement of employees would result in a less effective outcome for the recipient firm (Argote & Ingram, 2000).

There are other existing methods to gain access to new knowledge, like for example, building a strategic alliance (Mowery, Oxley, & Silverman, 1996), licensing agreements (Arora, 1995) or through foreign direct investments (Shan & Song, 1997). Hiring employees from external firms has proved to be a successful method in order to pave the way for future knowledge creation and learning (Song, Almeida, & Wu, 2001). In their study, saliency not only resides in the recognition of the hiring practices as a form of knowledge affirmation and further development, but also in the role played by the moving employees who can represent a positive mechanism to overcome international barriers. Such research issue has also been further developed by Rosenkopf & Almeida (2003): the mobility of engineers is a decisive strategy that can be implemented by firms in order to go beyond the limits forced by technological and geographic distance. Thanks to mobility,

knowledge can flow across these obstacles and spread in other contexts than those characterized by geographic or technological proximity.

Additional studies have proved that learning by hiring does not occur in the same fashion for all types of hiring firms. Firms that are more likely to appropriate new hires' knowledge are indeed those that are less path dependent (Song, Almeida, & Wu, 2003). As firms become somehow successful, they start to rely on their previous set of activities, routines and practices that have guaranteed such positive results. However, these firms will tend to incur in a progressive myopia, relinquishing exploring activities and thus ignoring external knowledge, which is distant from their philosophy. That is why the less path dependent a firm is, the more it envisages the chances to source knowledge from the outside.

In the same way, the chances that knowledge will be transferred from one firm to another is higher when hired engineers have different competences from the ones owned by the firm and when engineers operate in peripheral areas in the new firm (Song et al., 2003). The line of reasoning stands in the fact that a too deep immersion in the new firm's routine may hamper the use of the new hires' previous knowledge. Yet, at the end of the day, there are some remedies to deter firms from appropriating the benefits of the new hired employees, like the firm reputation for litigiousness in patent enforcement (Agarwal, Ganco, & Ziedonis, 2009).

Palomeras & Melero (2010) have also highlighted how learning by hiring has become a positive strategy aiming at absorbing external know-how. While previous literature has shown that hiring away represents a method to acquire external knowledge brought by employees, the aforementioned authors have considered another perspective in their study, focusing on the aware decisions taken internally by organizations, which are perfectly condensed in these words: "firms hire away inventors from whom they can learn from" (Palomeras & Melero, 2010, p. 893). Learning becomes indeed a process that is not complete once a worker arrives in the new firm but, instead, it keeps on running over time.

Human transfer is crucial when dealing with tacit knowledge, which is well-known to be extremely hard to obtain and replicate. Leonard-Barton (1995) confirms that tacit knowledge is very difficult to disentangle from the people who own it and, therefore, hiring people away from other organizations represents a successful way to appropriate the benefits of tacit knowledge. The peculiarity of being tacit is considered to be an important reason underlying the localization of knowledge.

Almeida & Kogut (1999) have illustrated how several regions in the USA are characterized by a more vibrant environment, in which innovation and knowledge flows play an important role. Regions like Silicon Valley and Route 128 concentrate the ideas of the best scientist worldwide. Knowledge is mainly localized in these areas because embodied tacitly by scientists who, due to the favorable conditions of markets and networks, stay in these areas. Hence, the fact that knowledge remains localized and does not spill across other regions. In addition to that, localization of knowledge is in turn strengthened by the social ties that inventors build during their permanence in one place. Agrawal, Cockburn, & McHale (2006) have found that even after the departure of an individual from his/her previous workplace, colleagues keep on citing his/her patents and works. This shows the persistence of the localization of knowledge over time.

2.2.2. Mobility Predictors

Part of the scholars has also investigated the characteristics owned by the employees that are correlated to the likelihood of moving away to another firm. Carnahan, Agarwal, & Campbell (2012) have found out that, in organizational contexts where compensation dispersion is really pronounced, high performers employees are less likely to move away to another firm where this difference is less marked. On the contrary, under the same organizational conditions, low performer employees are more likely to move where the gap among earnings is less marked.

Instead, in technological context characterized by knowledge complexity, the likelihood to move to a competing firm decreases as complexity increases (Ganco, 2010). However, at the same

time, knowledge complexity encourages people to leave in groups, thereby incrementing the probabilities of team mobility (Ganco, 2013). Complex knowledge in fact, as the adjective suggests, is hard to transfer. A significant part of it can be tacit, difficult to replicate and, therefore, not all recipient firms might be ready for its integration and adaptation. Moving away in teams facilitates instead such transfer because implicit routines and mechanism are already part of the group.

When authors deal with employee mobility, they have always to face a thorny dilemma. While some scholars believe that knowledge and organizational superior performances reside in the talent and personal skills of the workers, others attribute firm's greater outcomes to the firm-specific resources. In their work, Felin & Hesterly (2007) have gathered opinions and positions of different authors about this issue, also known as the "locus of knowledge". A small set of researchers identifies individuals as the holders of knowledge and skills, thereby considering firms only as the environment in which such knowledge is exploited. Thus, the main role of firms consists in integrating and coordinating the knowledge embedded in individuals' mind according to the organization's characteristics (Grant, 1996, p.120).

The majority of scholars, instead, highlights the primary importance of the firm as the source of knowledge. As for Winter (2003, p. 991), dynamic capabilities, which reside within firms, are the bases for all types of output creation. All in all, the performances of top employees can be seen as the result of the employee-firm combination. This is what Groysberg, Lee, & Nanda (2008) have found while investigating the careers of star security analysts after changing organization. Since a large part of their success depends on tacit knowledge, which is embedded in organizational routines and network relationship, these star analysts display worse performances when they start working in a new firm. This demonstrates how individual skills are not enough to guarantee important achievements within the organizational context. Lower performances can be attenuated when star employees move to organizations with better capabilities, thanks to the offering of the firm's high quality support, and when outstanding workers move away together with colleagues,

thus recreating informal mechanisms and conditions that enabled superior performances in the previous firm (Groysberg et al., 2008).

Another important role is played by experience. When organizations compete, they put in place strategies aiming at obtaining an advantage to the detriment of rivals. Hiring an employee from a competing firm might be a valid way to elicit rival's strength and take advantage of it. In particular, a firm that competes against a rival who has hired a key employee from it, sees a decrease in its profitable set of routine (Aime, Johnson, Ridge, & Hill, 2010). Being familiar with routines and practices proper of a superior firm helps opponents to use tactics and mechanisms in order to set up a strategy that will limit the gap between the firms. In the same fashion, both the increased and the expected exposure to a firm's superior set of routines from other firms, progressively limits the primacy of the leading firm when a top employee move from the leading to one of these firms (Aime et al., 2010). Learning and adapting to the advantageous set of routines owned by the leading firm makes sure that the other competing firms develop proactive responses and decrease the disadvantage vis-à-vis the leader.

When individuals move alone to another firm, they bring the entire set of skills and competences they possess. However, when not only a single individual but also other colleagues move from one place to another, the stakes are very high. It is obviously about transferring skills and human capital, but in particular moving away with other people regards also other elements. The transfer to another organization in teams entails the fact that it is an entire network proposing itself in a new context. Such individuals do not only bring their talents somewhere else but, together, they are also able to recreate relationships with customers, suppliers and other agents.

Agarwal, Campbell, Franco, & Ganco (2015) have analyzed team mobility and have come up with the result that the more people leave together a firm and the more disadvantages the source firm will endure. On the contrary, as for the creation of spin-outs, the more people leave the source firm and the better performances the spin-out will have (Agarwal et al., 2015). Along with this line

of reasoning, other studies regarding source firm's effects have been recently taken into consideration. For example, the same authors, have demonstrated how source firms suffer from a larger adverse impact when mobility is towards a spin-out and when the moving employees have higher earnings (Campbell, Ganco, Franco, & Agarwal, 2012).

2.3. Mobility to Entrepreneurship

2.3.1. The Entrepreneur

The reasons behind the decision to leave an established firm and to start a career as an entrepreneur can be innumerable, ranging from the liberty regarding the exploitation of innovative ideas, to the motivation to be your own boss, to self-realization needs and many more. Academic literature has extensively studied the field of entrepreneurship, observing the fragmentation of such domain, characterized by a multitude of different opinions. Researchers have often abstained from giving the definition of "entrepreneur", since the heart of the debate questions the types of approach to the analyses of the figure at issue. Some scholars believe that the best way to depict the role of the entrepreneur is by using a trait-based approach, i.e. investigating the physical and mental characteristics in order to define who the entrepreneur is. Some other scholars believe that entrepreneurs should be studied according to what they do, regardless of their personal peculiarities.

The trait-based approach considers the features that distinguish entrepreneurs from non-entrepreneurs, with the final aim of outlining the ideal paradigm. There are authors, like White, Thornhill, & Hampson (2006), that have called upon other disciplines to help them to identify the archetypical traits. In specific, the three authors have analyzed the biological characteristics of the individuals, both people who had already had an experience as entrepreneurs and people with nor intentions or experience in entrepreneurship. Those who have been engaged in a new venture formation process showed a higher level of testosterone compared to the other group, proving the

fact that people with higher levels of this hormone are expected to perform more entrepreneurial behaviors than the others. However, psychological factors, like risk propensity, mediate the relationship between biological characteristics (testosterone level) and final behavior (startup formation) (White et al., 2006, p. 30).

Instead of focusing on biological characteristics, other authors have deepened the cultural-cognitive traits of individuals trying to find a relationship with entrepreneurship. It has been seen that individuals showing a lot of creativity, a high propensity in taking risks and a desire for a strong feeling of independence are more likely to engage in entrepreneurial behaviors (Knörr, Alvarez, & Urbano, 2012). On the same fashion, Morris, Davis, & Allen (1994) have found in individualism a cultural factor that is positively associated to the tendency to start a new venture. Their study shows that individualistic rather than collectivistic cultures display cultural-cognitive characteristics (emphasis on self-sufficiency, intense sense of personal gain…) in line with the propensity of being an entrepreneur. Having said that, some personal traits are related to higher probabilities to form startup and, since some cultures own such traits more than others, it follows that there are cultures traditionally more inclined to perform an entrepreneurial behavior.

However, following the theories expressed by Galor & Michalopoulos (2012), personal traits tend to evolve over time, in particular in the different phases of human history. While in the economic development stages, entrepreneurs show a positive attitude towards risk, in the economic mature stages this attitude changes, pushing individuals to avoid risky situations. This study highlights how traits are not stable across time, but they can vary conditional on economic conditions. In the literature, in general, there is a massive use of psychological factors to give explanation to entrepreneurial behaviors, and this is also the case of the study of the motivations to start a new venture (Segal, Borgia, & Schoenfeld, 2005; Shane, Locke, & Collins, 2003).

Still remaining under this trait-based perspective, scholars acknowledge the presence of other factors pushing individuals to become entrepreneurs, as is the case with external (regulations,

market dynamics etc.) and social factors (social class, family background). This is the reason why authors have developed models that encompass different hypothetical antecedents in the analysis of entrepreneurship, that is to say contemplating the possibility that different types of factors could influence entrepreneurial activities simultaneously. White, Thornhill, & Hampson, (2007) have considered different types of factors (family background as a social factor and testosterone level as a biological factor) to explain the tendency to start a new venture. Results indicate that prior business events in the family together with a high level of testosterone predict higher likelihoods of founding a startup, thereby giving also credit to their use of a "bisocial" model.

There are scholars instead, who believe that the identification of an entrepreneur should start by observing his actions and not by his personal characteristics. Gartner (1988) supports this behavioral approach and believes that information about individual characteristics are only accessory when considering the figure of the entrepreneur. The focus, in this view, is slightly shifted from the individual to the organizational level, since the entrepreneurs' actions are part of the process of organizational creation, whereas the entrepreneurs' individual characteristics take second place.

At the end of the day, both trait-based and behavioral approaches taken singularly do not allow to provide a commonly accepted definition of entrepreneur. That is why, now, many school of thoughts are considering these two approaches together rather than in contrast, consequently considering the figure of the entrepreneur the result of both an individual's personal characteristics and behaviors (Krueger, 2002, p.49).

2.3.2. Market Access

Regardless of the identification of the figure of the entrepreneur, the literature has also focused on other aspects concerning the creation of a new venture and, specifically, on the transition from an established firm to a startup. The studies led by the majority of the researchers privilege the analyses of the conditions underlying the propensity to found a new organization. Likewise, in order

to pinpoint the peculiarities of the startups, scholars have put a great deal of effort as well into the investigation of the related parent firms, which can unveil precious information about the newly generated startups.

When entering a market, startups have the difficult task to find a position that can guarantee the firm's survival both in the short and in the long term. According to Schumpeter (1934), the process of entrepreneurship provokes a phenomenon of creative destruction, where the entrance of a new venture in the market causes the decline of the products and services offered by the incumbent firms, resulting, at the end of the day, in a zero-sum game. This view indeed, does not contemplate the simultaneous economic advancement of the two different typologies of firms present in the market, incumbents and startups, because it believes that one's own victory always occurs at the expense of the others.

Another view, shared by Agarwal, Audretsch & Sarkar (2010), considers the entry of a new venture in the market as a possible win-win scenario, where incumbents and startups succeed in coexisting also in the long term. Such view describes the entry of new ventures directly emerging from established firms, often as a result of an underutilized stock of knowledge, which fresh startups attempt to exploit. From this perspective, the actions undertaken by new entrants allow the contextual survival of both types of firms, incumbents and startups, because it is believed that new entries do not necessarily implicate the detriment of already existing firms in the market. Indeed, this process of creative construction enables startups to take advantage of the market conditions, without jeopardizing the existence of incumbent firms. This because of both an increase in demand and a competitive role in the market that turns out to be complementary rather than opposing (Agarwal et al. 2010).

However, despite the possibility that both already existing firms and startups may live side by side, such coexistence does not exclude the chance that one economic actor might ensure its own supremacy. Ganco & Agarwal (2009) argue that the superiority in performances between

established firms (diversifying entrants in this case, i.e. already existing firms entering a new market) and startups (new ventures tout court) depends on the industry life cycle. In the early stages of the industry, characterized by an intense disorder, diversifying entrants have higher performances than startups, because the former possess a consolidated set of routines that helps them to overcome uncertainties more than what startups can do. Startups, in fact, do not own stable routines to count on, however they possess strong flexibility and a higher capacity of learning. That is exactly in the later phases of the industry life cycle that startups outperform diversifying entrants, by adapting to the new environmental conditions. In the later stages of the industry, the processes of learning make the difference between winners and losers, favoring the economic actors able to take advantage from new stocks of knowledge. In such context, startups handle organizational learning better than diversifying entrants, resulting in an increase in performances for the former vis-à-vis the latter (Ganco & Agarwal, 2009).

2.3.3. Entrepreneurship Predictors

One of the most common trends in the literature is represented by the attempt to investigate the conditions under which former employees decide to leave an established firm and join or found a new venture. The analyses led by scholars particularly focus on the antecedents regarding the decisions to engage in an entrepreneurial venture. In other words, what has been extensively studied so far is the set of human and organizational conditions that mostly predict the likelihood of joining a startup. The conditions lying behind such decisions can be various, however some common features and trends can be identified in the vast ocean represented by the entrepreneurship literature.

According to Burton, Sørensen & Beckman (2002), the organizational social structure is a factor influencing the entrepreneurial activity. Entrepreneurs who had a prior experience in an established firm with prominence in the industry are more likely to pursue risky entry strategies and innovative practices as well. At the same time, entrepreneurs characterized by this type of career

are more likely to obtain external financing, fact that supports the importance of the social background, whose influence is also reflected in the creation of new ventures (Burton et al., 2002).

The ability to recreate the conditions for the development of a new entity has also been recognized as a key factor influencing the abandonment of an established firm. In actual fact, founders with high quality display the tendency to gather around them a higher number of individuals and also teams with a longer shared experience (Agarwal, Campbell, Franco, & Ganco, 2015). This is because the founder's former colleagues perceive the chances to be successful by founding a startup, inasmuch as they know that the founder possesses strong abilities, thus contributing to the establishment of the new venture. At the same time, the departing employees, leaving the source firm in favor of the newly created firm, contribute to the detriment of the former due to the conspicuous set of routines and knowledge exiting the firm. Furthermore, the dimension of the assembled team has a mediating effect on both the negative relationship between founder quality and source firm performance, and also a mediating effect on the positive relationship between founder quality and startup performance. Similarly, team tenure mediates the positive relationship between founder quality and spinout performance (Agarwal et al., 2015, p. 25).

In addition to the aforementioned study, other works in the entrepreneurship literature interrelate high quality individuals with the likelihood of forming a new startup. One of these is again the study led by Carnahan, Agarwal, & Campbell (2012), which analyzes the consequences arising in different organizational contexts, characterized by diverse compensation systems. In an organizational environment where compensation dispersion is really pronounced, top performers are less likely to move away compared to other organizations that do not have such sharp difference in remunerations. However, if these top individuals decide to leave, they are more prone to engage in the creation of a new venture. So, this study, like many others, puts in connection the quality and performances of individuals together with the inclination to found a brand new firm. At the same, the study has shown that under the same organizational conditions, i.e. in firms that show a marked

compensation dispersion, individuals with low quality tend to leave firms more often than their counterparts in different firms and, moreover, they are less likely to start new ventures (Carnahan et al., 2012).

Similarly, Campbell, Ganco, Franco & Agarwal, (2012) have investigated the relationship between the earnings of individuals in a firm and the related probability to start a career as an entrepreneur. This study has a lot in common with the previous one by Carnahan et al. (2012), because the earnings achieved by employees can be considered somehow an estimation of the quality of workers, thus linking once again quality of individuals and entrepreneurial propensity. The four researchers have proved that employees with higher salaries show less likelihoods of leaving their current firm compared to colleagues with a lower income. However, if employees with higher earnings decide to leave the firm, they are more likely to found a startup than moving elsewhere to another established firm. Furthermore, source firms suffer from a larger negative impact when former employee engage in entrepreneurship rather than moving to another existing organization (Campbell et al., 2012).

Other streams of literature have focused instead on the relationship between knowledge complexity and the decision to found spinouts (Gambardella, Ganco, & Honoré, 2014; Ganco, 2010; Ganco, 2013). According to Gambardella et al. (2014), what favors entrepreneurship is the self-recognition of the innovation complexity intrinsic to the patents previously filed in the incumbent firm. This simple fact of self-awareness has proved to be beneficial to the beginning of a process of spinout formation. However, if the invention made by the employee is licensed or commercialized by the firm, the probabilities that the employee will start a new venture drastically decrease. Such findings are perfectly in line with the authors' theories, that is to say that a strong driver for the launch of a spinout is the amount of knowledge that is underutilized by the firm. Hence, the decision made by employees to start their own new ventures with the chance to better exploit knowledge ignored by the source firm. The study also shows that the simultaneous recognition of an idea

innovativeness by both the firm and its originator entails an employee higher likelihood of engaging in an entrepreneurial activity, compared to the mere self-recognition, on condition that the firm has not commercialized the innovation (Gambardella et al., 2014).

Besides underutilized knowledge, there is also complexity of knowledge influencing and orientating entrepreneurial activity. The more the knowledge is complex within an organizational environment and the more the employees will show a tendency to form spinouts. Such propensity prevails on both the decision to stay in the firm and on the decision to leave the firm to join an established firm (Ganco, 2010). As studies show, on the one side knowledge complexity makes it difficult to transfer know-how and expertise beyond the organizational boundaries, on the other side it pushes employees to launch processes of new venture creation. Furthermore, knowledge complexity increases the chances for individuals to leave the firm in teams, especially if they do not decide to join another established firm but to found a new startup (Ganco, 2013, p. 682).

2.3.4. The Parent-Progeny Relationship

In the field of entrepreneurship, numerous studies have concentrated energies in examining the relationship between spinouts and the relative parent firms. Although these two types of firms represent de facto two separate entities, the consequences of a spinout generation, undertaken by some of the employees coming from the established firm, might affect the conditions and performances of the parent firm.

The reason behind the negative impact on source firm is attributable to the transfer of human capital from established firms to spinouts. Routines, social capital and know-how are often embodied in the human capital and thus, as employees leave established firms to create spinouts, the parent firm sees itself deprived of important elements that have constituted its structure in the past (Phillips, 2002, p. 476). Yet, despite the frequent impoverishment of parent firms in favor of spinouts, spinouts' ability to survive in a determined environment directly depends on the characteristics proper of the parent firm (Franco & Filson, 2006; Phillips, 2002). The transfer of

resources and competences from the parent firm to the offspring entails a drop and an increase in the survival chances for the former and the latter respectively. Phillips (2002) has also noticed that resemblances between parent and progeny generate a negative impact to the disbenefit of parent firms. And more than that, a too variegated expertise in the early stages of a spinout formation hampers the development of the new venture, thereby impeding the growth of the new firm. Indeed, the chances for the new firms' survival are greater for those spinouts that descend from a single (and not plural) parent (Phillips, 2002).

In short, the spinouts' possession of the attributes proper of parent firms are not always a tool guaranteeing the organization's survival. What has been prosperous to a firm does not implicate the same outcome for another firm, hence the awareness that spinouts' appropriability of parents' resources and know-how does not represent a sufficient condition for firms' survival, albeit fundamental.

Franco & Filson (2006) have investigated the disk drive industry and have observed that the parent firms that display higher level of know-how are the ones that not only are the more likely to give birth to spinouts, but they are also the organizations that have higher chances of survival in the long term. Once again, the two authors confirm the importance of intellectual capital that moves from one firm to another, know-how in this particular case.

Another study that sheds light on the world of spinouts generation is the one led by Agarwal, Echambadi, Franco, & Sarkar (2004). This study is very similar to the aforementioned studies by Phillips (2002) and Franco & Filson (2006), as it investigates the same areas; however it comes up with new emerging trends and findings. Agarwal et al. (2004) have analyzed the relationship between parent firms and the relative progenies, defining the conditions that mostly favor the origin and the development of the latter. One main finding highlights, like Phillips (2002), the importance of possessing a know-how which has not to be too redundant. The four researchers have indeed discovered that the firm's possession of both a technical and a market pioneering expertise inhibits

the chances of a spinout generation. Yet, if the established firm only possesses one of the two types of the previously mentioned expertise, then it will be more likely to generate offspring. The advantage of having a parent with either an advanced technological know-how or a market pioneering know-how can be seen also in the future from the spinout point of view. In fact, the level of know-how inherited by the spinout will be positively related to the level of the parent firm's know-how at the moment of the spinout birth. Similarly, it has been seen that the level of both market pioneering and technological know-how will be higher for spinouts rather than new ventures that do not have a parent firm and established firm entering a new market. Furthermore, besides the level of market pioneering and technological know-how, spinout will be superior in the chance of surviving compared to other typologies of firms (Agarwal et al., 2004).

Sometimes the destiny of newly created ventures does not depend on parent firms, simply because new startups might not be the outcome a spinout creation process, but instead the outcome of a stand-alone creation process, unconnected with any sort of other existing organization. However, differences among these startups can exist, because different is the typology of the founder. Even though unrelated to established firms, startups have in any case a figure that launched the entrepreneurial process at some point in the past. Researchers have shown that, depending on the founder's career and educational background, the conditions and characteristics proper of the new ventures may significantly vary.

According to a general study of Agarwal & Shah (2014) that has reviewed the main literature contributions on the knowledge contexts in which new ventures are born, it can be said that the founders' previous career not only influences new firms performances, but also the trajectories in which industries tend to evolve. Nevertheless, there are relevant differences that can be identified also within spinouts. These differences still regard founders' career background, i.e. whether they come from an academic or an industry environment. Marand, Honore, Campbell & Agarwal (2015) have found that unlike academic spinouts, spinouts that have founders from the industry knowledge

context are associated with growth. However, such finding only stands if the team composing the new venture has all members coming from the industry. Contextually, it has also been verified that only spinouts from the industry knowledge context show a positive relationship between growth and the presence of founders with previous shared experience (Marand et al., 2015).

All in all, the importance of startups resides in their capacity to represent a vehicle through which innovativeness is spread across the world (Agarwal & Shah, 2014, p. 1130). For this reason, lots of new inventions are constantly carried out by young ventures, which display a strong pattern based on perpetual learning. However, while on the one side the larger a startup becomes, the more it exploits the knowledge created by others, on the other side, the larger a startup gets, the less it is able to benefit from learning from informal sources. Therefore, as startups become larger, they could profit from other types of external sources of knowledge, however their ability to learn from hiring or from regional co-location tend to decrease and consequently hinder their further development (Almeida, Dokko, & Rosenkopf, 2003).

When it comes to startups, salience does not only stand in the advantages that can be pursued while working in a startup. Campbell (2012) has confirmed that the benefits of working in a startup can persist over time, thereby guaranteeing positive returns even if the working experience within a startup refers to the past. In particular, Campbell (2012) has shown that the positive effects on earnings related to the participation into a startup are not limited to the period in which an individual actively works in a new venture, but they endure also in the future.

2.4. Ethnic Entrepreneurship

2.4.1. Antecedents

The number of studies dealing with ethnic entrepreneurship are growing in number and importance, because more and more people decide to move beyond the national boundaries to achieve self-realization needs. These individuals are often forced to leave their home country owing

to the underdeveloped conditions of markets and infrastructures. The objective of this part of the literature review is to grasp some critical patterns proper of immigrant entrepreneurs. It is thus important to understand who these people are, on whom they can rely and why they decide to start an entrepreneurial venture; and also, how this process works, what they actually exploit and, eventually, it is equally important to understand the effects and limitations of these phenomena. The following review concerns Indian immigrants and the United States of America as destination country in particular.

The majority of immigrants arrived in Silicon Valley after the Immigration Act of 1965, which enabled a huge amount of high-skilled individuals from every country in the world to move to California to improve their life and career conditions (Saxenian, 1999). The number of individuals moving to the US grew in a short amount of time and it gradually became clear that a significant part of them had Asian origins, Indians and Chinese above all. High-skilled Chinese and Indians broadly contributed to the development of important areas in the US, like Silicon Valley for instance, especially in high-tech industries, e.g. pharmaceuticals, semiconductors…(Kerr, 2008).

Over time, foreign-born individuals started gathering and creating associations with the aim of providing mutual help and technical consultation with regard to the economic sphere. In parallel, ties with home countries were strengthened, thanks to the innovations in fields like transportations and telecommunications (Saxenian, Motoyama, & Quan, 2002). By moving to the US, high-skilled immigrants provided benefits not only for the country that had hosted them, but also for their home country, once they decide to get back home. It is in such occasion that know-how and expertise accumulated in America by immigrants will be later utilized in domestic underdeveloped regions to contribute to the flowering of new economic activities (Saxenian, 2002).

2.4.2 Strengths and Weaknesses of Ethnic Communities

When we refer specifically to immigrant entrepreneurship, it is clear that the studies led by researchers who focused on the North America region mostly regard the most vibrant areas of the

US, Silicon Valley, Massachusetts and so on (Aliaga-Isla & Rialp, 2013). Yet, irrespective of the area in which studies have been carried out, it is fundamental to individuate the conditions that have allowed immigrant entrepreneurs to start their venture, in other words, understanding what lies behind their success. Research have found the answer: social capital. According to Adler & Kwon (2002), "Social capital is the goodwill available to individuals and groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor." Practically, condensing scholars' definitions, it can be said that the concept of social capital consists in the set of resources internal to a specific community, made available to each member in reason of relationship ties. When a member uses part of the resources, he is implicitly expected to behave helpfully towards the other members, following the principle of reciprocity (Almeida, Phene, Li, 2010). Entrepreneurs may actually possess the individual resources (ideas, knowledge…) that allow them to start a new venture, however they probably lack complementary resources (contacts, human capital, financing…), which can be found within the ethnical community (Thornton, Ribeiro-Soriano, & Urbano, 2011).

The strength characterizing ties binding immigrant entrepreneurs to their ethnic community is ascribable to the nature of this relationship. Indeed, besides the common origin of individuals, there can also be family relations underlying these strong relationships (Kalnins & Chung, 2006). The motivations lying behind the active participation into an ethnic community can be connected either to the willingness of individuals to carry on with the values of the community in which they believe or to the fear of reputation loss (Portes & Sensenbrenner, 2003). These communities are based on a shared feeling of trust that later on becomes a prerequisite for the community survival. Sanctions for those who break the community's rules are very onerous; usually they are non-material but, even though they might not consist in economic fines, they may have negative effects on one's own economic status in the long term (Portes & Sensenbrenner, 2003).

Despite all the positive values characterizing ethnic communities, like trust, solidarity, mutual assistance, there are also some negative effects that are directly connected with membership in a community. Portes (2000) for instance, affirms that the strength of a community can push its members to pursue behaviors and values shared by the group, even if these are known to be negative for others or for themselves. Similarly, communities like this, based on strong geographical ties, can impede the entry of new individuals, thereby not allowing new ideas and alternative know-how to enter the group. These practices can seriously endanger the survival of the community (Almeida, Phene, & Li, 2014). Furthermore, it has been noticed that an overreliance on the knowledge embedded in the community leads to a progressive decrease of innovation performances. Same thing for the innovators that try to draw on collaborators that come from the same community. The excessive use of such partners entails a decrease in the innovations sourced by inventors (Almeida et al., 2014).

In sum, the benefits of being part of an ethnic community are multiple and very significant. There is an extensive availability of resources that enable members to draw on whatever they need in that moment, financing, advise, materials and so on. The fact that all this organization is pervaded by a common sense of assistance, trust and solidarity, ensures that all members blindly rely on others. Moreover, eventual sanctions constitute a strong deterrent for any member to behave opportunistically.

However, being part of an ethnic community entails a strong sense of responsibility and respect. In fact, it has been seen, that any sort of community over-embeddedness, i.e. a too deep immersion in the routines of the community, are detrimental for any kind of member. Therefore, members should actively participate into the community's life, however, without closing the door to other types of external influences (knowledge sourced by others, external advices…) so as to find the correct balance between the use of internal and external resources.

2.4.3. Drivers to Entrepreneurship

Studies on entrepreneurship have also analyzed both how the process of a new venture creation stems from ethnic communities and also what newly created firms use as a vehicle to survive and expand in the markets. Observing such practices and elements helped researchers to shed lights on the characteristics of new ethnic enterprises. The diffusion of ethnic ventures in the cities does not necessarily respond to the fulfillment of individualistic needs, but instead it can be linked to policy manoeuvers implemented by the government to assist foreign workers in the labor market (Delft, Gorter, & Nijkamp, 2000). Therefore, sometimes self-employment is pushed by policy initiatives rather than personal motivations.

As scholars have found, the access to fundamental resources is not always easy for foreign-born aspiring entrepreneurs. Regardless of the industry in which they operate, immigrants can count on advantages that are usually precluded to other types of entrepreneurs. One of these is the participation in social networks, which allow entrepreneurs to rake resources and workforce, unlike non-immigrant entrepreneurs that usually are part of less tight networks. Similarly, the knowledge of two different cultures, both the one referring to the host country and the one referring to the country of origin, provide a significant head start on the other competitors (Delft et al., 2000, p. 432).

With regard to the new ethnic ventures, the environment in which they grow can be considered as a sort of natural business incubator. This term indicates the techniques put in place by communities to foster capitalization and development of startups (Greene & Butler, 1996). Thus, even though startups do not pass through a formal business incubator, the environment takes the formal incubator's place and permits the development of the budding firms. The differences between a natural incubator and a formal business incubator reside in the lack of a physical plant for the former, the recourse to internal and not external financing and indefinite and not finite sponsorship as for the former. In addition, natural business incubators go on in their activities

following institutional beliefs and not sponsorship types and formal business incubators provide services depending on the type of the incubator and not depending, as for natural incubators, on the needs of the business owner (Greene & Butler, 1996, p. 57). For this reason, the inception of new ethnic businesses falls under the category of natural business incubators, when it comes to assess the methods of business implementation.

Within the vast body of literature, Aldrich & Waldinger (1990) have presented an interesting review of ethnicity and entrepreneurship. The framework used by the researchers to analyze the combination of the two phenomena is very useful to elicit further insights about the matter. The framework at issue contains three elements: opportunity structures, group characteristics and lastly strategies, which emerge by the interaction of the other two components. Opportunities define the chances that immigrant entrepreneurs have to establish and expand their business both in an ethnic and in a non-ethnic market. As for ethnic markets, while on the one hand entrepreneurs can count on their internal presence within the ethnic community to be served and consequently succeeding in satisfying the expressed needs in a short amount of time, on the other hand this type of market is really circumscribed, impeding entrepreneurs to get larger. Instead, in order to be successful in non-ethnic markets, immigrant entrepreneurs should attack either an uncertain or an underserved market. Otherwise a market which deals with exotic products or a market characterized by low economies of scale (Aldrich & Waldinger, 1990, p. 116).

2.4.4. Cultural Values

Group characteristics depend instead on the culture of the community. There have been countless studies on the identification of the peculiarities and traits owned by the different ethnic groups. Among these, some studies have tried to connect individuals' cultural values and the tendency to engage in entrepreneurial activities. For example, Indian entrepreneurs have been the object of analysis of the studies led by Chand & Ghorbani (2011) and Shivani, Mukherjee, & Sharan (2006). Shivani et al. (2006) have investigated the relationship between socio-cultural attributes and the

entrepreneurship performance in India. Important differences are visible between men and women, being the former more successful than the latter in this domain.

The Indian social system is heavily influenced by the strong family ties and by the belonging to a cast (Nafziger, 1978). Indeed, cast and family support have been considered positive forces to the growth of an entrepreneurial venture (Shivani et al., 2006). Chand & Ghorbani (2011) instead have focused the attention on the cultural values proper of Indian and Chinese immigrants in the US. By relying on data provided by Hofstede (1980), who describes cultures by attributing a score to five predetermined dimension (individualism vs. collectivism, high vs. low power distance, masculinity vs. femininity, uncertainty avoidance vs. uncertainty acceptance and short-term vs. long-term orientation), the two authors have tried to predict the likelihoods of engaging in entrepreneurship according on the scores marked by cultures in each of these dimensions. This because each dimension can be connected to a major or minor tendency to start a new venture. The theoretic work led by Chand & Ghorbani (2011) sheds light on the fact that some cultures might socially be more inclined to start a career as an entrepreneur than others, because of the existence of these dimensions, which are dependent on the culture social capital.

In sum, it can be affirmed that entrepreneurship is undoubtedly influenced by predisposing factors that are in turn built upon cultural traits and features.

2.4.5. Constraints and Knowledge Spillovers

Strategies that are later followed by ethnic entrepreneurs in order to achieve their goals are the result of the decision-making process that derives from the interaction of opportunities and group characteristics (Aldrich & Waldinger, 1990). Yet, strategies can be negatively influenced all of a sudden by legislations or public policies, which force aspiring entrepreneurs to tweak their game plan or, in worst cases, to passively undergo the modified rules of the game. Young entrepreneurs have often to endure regulation changes and constraints that are linked to the permanence in a foreign country.

Kerr & Lincoln (2010) have noticed an increase in inventions in correspondence of more extended H-1B visa grants for immigrants in the US. Similarly, Ganco (2014) has found detrimental effects on entrepreneurial activities due to green card timing. However, such negative consequences are not that significant for the entrepreneurship phenomenon as a whole, but they entail effects that are more negative for those individuals who decide to shift to self-employment rather than growth-oriented entrepreneurship (Ganco, 2014).

The presence of ethnic communities situated in different parts of the world has pros and cons with regard to the development of innovations. As for the US, patenting activities undertaken by immigrant college graduates have deeply contributed to the boost of innovation in the second half of the last century. Their patent activity is more trenchant than the activities performed by their native counterparts, because of the larger share of immigrants deciding to obtain a degree in science or engineering (Hunt & Gauthier-Loiselle, 2008). This is thus an example of the benefits, also enjoyed by the hosting country, arising by the activities performed by foreign-born workers, who are supported by a lively ethnic community.

When high-skilled individuals decide to emigrate, two significant phenomena simultaneously emerge. On the one side, departing immigrants impoverish their country of origin, especially its knowledge network, resulting in the so-called “brain drain” effect. On the other side, high-skilled immigrants contribute to the enrichment of the stock of valuable knowledge abroad, the “brain bank” effect, because hosting countries have usually better working conditions, infrastructures and so on. Despite the innovations developed thanks to the knowledge accumulated abroad, the poor countries, homeland of the emigrant individuals, register better economic conditions when talented workers do not leave (Agrawal, Kapur, McHale, & Oettl, 2011). The extent of knowledge spillovers can be also seen in the way researchers cite compatriot authors. Breschi, Lissoni & Miguelez (2015) have conducted an analysis oriented to the recognition of the “diaspora” and “brain gain” effect within different national community. The former effect refers to the ethnic inventors’ patents cited

by co-ethnic researchers that have moved to the same country. The latter effect deals with ethnic inventors' patents cited by co-ethnic individuals residing in the same country of origin. Findings suggest that India for example shows not only a "diaspora" effect, but also an "international diaspora" effect, i.e. co-ethnic inventors that cite each other, irrespective of where they live (Breschi et al., 2015).

Engagement in entrepreneurial activities by immigrants does not only occur in the host country as a consequence of a wish to fulfill career needs, but it can also happen once a high-skilled individual returns back to his home country. The reasons lying behind this decision can be numberless and can range from the wish to develop the domestic economy, to family closeness and so forth. Countries like India, for instance, are very interested in accepting returnees because they both are among the most skilled individuals and because they bring back new knowledge and expertise to exploit (Kenney, Breznitz, & Murphree, 2013).

3. Methodology

3.1. Research Purpose and Expectations

This study aims at investigating the rate of individual mobility characterizing Indian inventors in the US semiconductor industry. The birth of ethnic associations, like The Indus Entrepreneurs (TiE), has changed the way Indians do business, especially in the entrepreneurship domain. This phenomenon, in reality, dates back to the first years of the '90s. Such associational activity started out in the most innovative and vibrant area of the US, Silicon Valley, to later expand towards other territories, such as numerous locations in the US at first, and other countries across the globe at a later time.

By observing how deep and important the influence of TiE still is among Indian entrepreneurs, I would expect some sort of change in the patterns describing Indian mobility rates after the inception of TiE, especially for what it concerns entrepreneurship. In addition to

entrepreneurship, there will be a specific focus on California, homeland of TiE, where these shifts are expected the most, since TiE expanded itself outside California only at a later stage.

A second area of investigation focuses instead on the differences that Indian inventors show in their performances. A vast body of literature declares that people moving away, either to join other established firms or startups, have different characteristics from the ones who do not move. For this reason, a test on Indian individual performance characteristics will be conducted in order to be able to assert whether or not differences among moving and non-moving employees exist in this specific context.

3.2. Research Approach

This study makes use of both a qualitative and a quantitative research approach. The combination of the two approaches permits the analysis of any phenomenon in a deeper way, compared to the adoption of a single approach. Such contextual use should lead to the so-called "fundamental principle of mixed research" (Johnson & Turner, 2003). According to this principle, the mixed approach should bring the researcher to a final situation in which the strengths of the two different approaches are complementary and the weaknesses attenuated (Johnson & Turner, 2003).

As for this study, the qualitative approach refers to the collection of data, information, quotations, etc. that enable a wide comprehension of facts, specifically where numbers and figures are not enough. Such approach has been mainly used for the description of the peculiarities of the ethnic communities and for the description of TiE. In these two cases, like also for the literature, the recourse to other studies, quotes, excerpts from documents, interviews and websites, turned out to be fruitful to understand events and circumstances in their entirety.

The quantitative approach deals with the handling and transformation of numerical data in outcomes that should answer the questions of researchers. It is all about statistical analyses and the research of evidences confirming the investigator's suppositions. In this study, the use of a

quantitative approach refers to the use and transformation of data oriented to the identification of particular mobility patterns and differential performances in the activities of Indian scientists in the US.

Therefore, in short, the advantages of this dual approach should be beneficial to this study. A hybrid approach helps to give meaning, relevance and voice to numbers, to add further insights to the topic at issue and to provide more robust evidence to the final results (Johnson & Turner, 2003).

3.3. Data Collection

This study is based on the use of secondary data, that is to say data that have already been collected for other purposes. According to Hox & Boeije (2005), working with secondary data presents various pitfalls for researchers, since such data are usually not tailor-made for a specific study other than the one for which they have been generated. These pitfalls consist in the localization of the source that has created the data, the retrieval of the suited data and eventually the verification that data are in line with the study requisites (Hox & Boeije, 2005). In general, any research method has to deal with the validity and reliability of data. The former issue regards the fit that exists between reality and data. However, it is not a problem of data themselves, but rather a problem connected to the use of data made by researchers (Vaus, 2013). Reliability instead, refers to the extent to which the same data can provide the same outputs on all occasion, ceteris paribus (Yin, 1994).

The data used in this study to analyze the mobility rate of Indian scientists and their relative performances, are a vast set of patents, precisely the ones provided by the National Bureau of Economic Research (NBER) database of the U.S. Patent and Trademark Office (USPTO). Before using this set of patents, I made sure these were appropriate to the study I wanted to conduct.

Following the difficulties presented by Hox & Boeije (2005) in the use of secondary data, it can be said that the benefits generated by this database clearly outdo potential shortcomings. First, the source that has produced this incredibly vast set of patents is known to be reliable and therefore

no doubts about the relevance of the source can be raised. Second, the retrieval of the data has been a long computational process, originated from the need to have available various data, containing the dimensions to be analyzed. There has then been an intense computational process in which raw data have been adjusted to produce usable data for the correct execution of this study (a deeper description of this process will later follow). Third, after the operations done on original data, the resulting final set was absolutely apt to investigate the predetermined phenomena. In the end, data have also to fulfill validity and reliability requirements. The fact that any other person can replicate the study with the same results guarantees a strong form of reliability to the data at issue. This study can thus be performed and replicated arriving at the same findings, on condition that the data employed should be the same of the ones treated in this study. After all, individuating from the beginning a strong source of data constitutes an excellent starting point for any type of research.

The recourse to patents to determine inventors' mobility patterns has been largely used by the literature. It constitutes a valid track of the presence of inventors across organizations and can thus be utilized as an indicator to determine where individuals work. In fact, besides a wide quantity of other information included in its description, each patent presents the assignee lettering, which identifies the entity to whom the rights of the patent are transferred. Since individuals generally patent within organizations, such lettering coincide with the name of the firm in which individuals have patented. Albeit the widespread use of patents for this type of studies, movements across organizations cannot be noticed every time. This because, for instance, an inventor might decide to consciously patent his idea only after he has moved to another firm, thereby not leaving any trace of his past presence in the source firm. In this way, when an individual does not patent his ideas, he leaves no signs at all, therefore making it impossible to retrace his mobility patterns across organizations.

In addition to validity and reliability, data should also fulfill generalizability requirements; in other words, the extent to which the conclusion of the study can be extended to other contexts involving the same actors. There are different points of view among scholars on this issue, i.e.

whether a single study is enough to propose findings that can be generalized. This study does not have the pretension to be universal; however, since it has been built on a wide and valid set of data, the final results truly report the phenomenon under analysis.

The other secondary data employed in this study refer to academic papers, online websites and interviews created by other people, but used in this occasion to depict the environment to which patents, and hence human capital transfers, refer. Studies and academic papers have been the source for the creation of the literature review, whereas online websites have supplied critical information regarding immigrant communities and ethnic associations. All in all, according to the aforementioned remarks and checks proposed by other authors, the whole set of data collected to lead this study should be appropriate to try to investigate the phenomenon of employee mobility among Indian inventors, especially for the empirical part.

3.4. Data Handling

The patents retrieved from the NBER database of the USPTO correspond to a total number of 31,572 patents, applied between years 1975 and 2008. The entirety of these patents refers to active Indian inventors in the US in the semiconductor industry. The basic form, as well as starting point for the data handling, presents itself in the following form (Table 1):

ID	Application Year	Assignee	Firm Identification Number	Inventor Name	Patent	Grant Year
1	1996	SUN MICROSYSTEMS INC	12437	SRIVATSA, CHAKRA R	6009253	1999
1	1996	SUN MICROSYSTEMS INC	12437	SRIVATSA, CHAKRA R	1796	1999
1	1996	SUN MICROSYSTEMS INC	12437	SRIVATSA, CHAKRA R	5838580	1998
1	1999	LSI LOGIC CORPORATION	163619	SRIVATSA, CHAKRA R	6523055	2003

Table 1: information regarding patents

- ID: a code that univocally defines each inventor;
- Application Year: the year the request has been forwarded to the USPTO;

- Assignee: the name of the firm in which the inventor has patented;
- Firm Identification Number: a code that univocally defines each firm;
- Inventor Name: name of the inventor;
- Patent: patent publication number;
- Grant Year: the year the patent has been issued;

The first step was to review each inventor and decide whether the ID (inventor) had moved to another firm during his patenting activity. By looking at the database, an inventor is considered to be moving when he has at least two patents with a different assignee. In order to differentiate the moving inventors from the non-moving ones, each ID was given an additional code, 0, 1 or 2, depending on his mobility. This was therefore the way to sort Indian inventors in a very fast way. Code 0 has been given to all IDs that did not display any mobility pattern; in other words, to all individuals who patented in the same organization along their active career. Code 1 has been attributed to all IDs that proved to move across organizations over time. This is the case of inventors patenting in different firms. Code 2 instead, to all inventors whose mobility pattern was not clear enough to determine whether moves occurred or not.

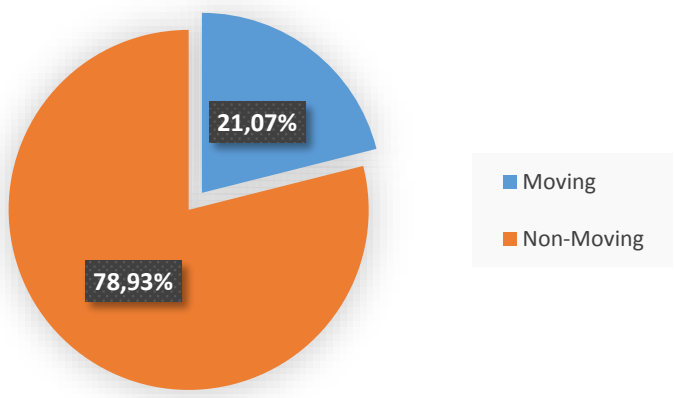
When sometimes mobility patterns are not that clear from the set of patents, the reason might reside in the name of the assignees. Sometimes several IDs showed some patents with slightly different assignee names, a specific circumstance that impeded the recognition of the typology of individual (0, 1 or 2) at a very first glance. This was mainly due to incorrect assignee name, typos or the possible presence of subsidiaries. With regard to this study, an eventual mobility from an organization to its subsidiary has not been considered as a mobility. Furthermore, code “2” was given to all inventors that showed too irregular mobility patterns, characterized for example by a series of repeated assignee alternations. To put it briefly, any inventor with an unclear sequence of patents has been marked with code “2”, “not clear”.

After this first round of control, carried out to complete a first rough discrimination among Indian inventors, a second review round was initiated. This second round had the goal to definitively distinguish moving inventors from non-moving inventors. So, starting from individuals coded as "2", additional checks have been made to verify the correct patent sequence of these inventors. In case of clearer understanding of any of these sequences, a new allocation was indeed possible. Therefore, again, code "1" has been attributed to the ones who turned out to be movers and code "0" to the inventors who did not show any change in their assignee along their career. After this, it was time to control again individuals classified at first as non-movers. Therefore, further controls have been run on the names of the assignee belonging to different patents. In this case, the main difficulty was to make sure that assignees with slightly different names, due probably to typos, were not two separate firms in reality. In this positive latter case, the inventor has been transferred into the category characterizing moving individuals (code 1), on condition that his mobility pattern was clear.

Then, inventor classified in the beginning as movers have been re-inspected and reallocated elsewhere, if a non-moving or a not clear sequence of patents unexpectedly emerged. Now, before using the final individuals according to their classification, a last control was needed. This control has been about the recognition of potential alliances and acquisitions among the firms included in each inventor's patent assignee. SDC Thomson Platinum has been the tool through which this inspection has been implemented. The database at issue includes a large quantity of alliances and acquisitions occurred in the last fifty years in the semiconductor industry. Behind this test, there was the necessity to exclude from the set of potential final movers all individuals that had filed two consecutive patents in two different firms, either object of an alliance or acquisition process. The alliance and acquisition databases have permitted a precise control, with specific regard to the match between the application date of patents and the date of alliances. Online websites, thanks to the incredible amount of information provided, constitute a good source for the research of details regarding organizations, especially firms' personal websites, supplying sometimes information

about acquisitions and alliances. The decision to get rid of individuals with relative assignees involved in an alliance, is to attribute to the fact that even if an inventor has not left his current organization, he might have patented on behalf of the organization he is collaborating with, thereby resulting as if he has changed employer. Same thing for acquisitions; a different firm name in the assignee of an inventor's patent might mean that the firm has been acquired by another firm, which now appears as the formal assignee of the patent. However, if this is the case, the individual might not have moved from his original workplace. Therefore, in conclusion, any detected form of alliance or acquisition entailed the exclusion of the person concerned from the set of final potential movers and its reallocation among the non-movers.

After this latest control, movers (code 1) and non-movers (code 0) have been definitively individuated, and the unclear data (code 2) permanently abandoned. Results show a total number of 1960 active inventors, 413 moving and 1547 non-moving (Graph 1).



Graph 1: this graph shows the proportion of moving and non-moving individuals on the total active inventors

And more than that, all these inspections have enabled the identification of the two typologies of firms, characterizing the moves of departing employees, that is to say source firms and

recipient firms. The former consists in the firms from which individuals move, whereas the latter represent instead the firms that employ such individuals. Lastly all of these firms, regardless of whether they are source or recipient firms, have been the object of an additional research, oriented to the finding of relevant organizational information. The information at issue are the following (Table 2):

Assignee	Founding Year	Acquisition Year	Closing Year	Acquiror	Headquarters	Industry	Size
SUN MICROSYSTEMS INC	1982	2010	2010	Oracle Corp	Santa Clara, CA, USA	Computer Systems	38600

Table 2: example of information regarding firms' organizational characteristics

- Founding year;
- Closing year (if occurred);
- Acquisition year (if occurred);
- Headquarters location;
- Industry;
- Size (number of employees);

These variables have been very useful to get a rapid overview of each of the firm either acting as a source or as a recipient firm. Furthermore, some of these variables (headquarters location, founding year) will be fundamental for the characterization of firms later in the analysis.

4. Analysis

Once the data have been collected, an in-depth analysis can be executed.

4.1. Defining Mobility Year

The goal of this study is to assess if the mobility patterns displayed by Indian inventors have changed across the years, in particular for the individuals moving towards startups. This is because, there is the intention to see if changes in the way Indians engage in entrepreneurship, produced by the advent of new ethnic associations like "The Indus Entrepreneurs" (TiE), are also reflected in their mobility rates.

The first step here was to get back to every single inventor in the database and compare the application year of the first patent filed at the recipient firm with the application year of the last patent filed at the source firm. This comparison has been executed in order to understand the year in which each Indian inventor has left his previous firm (source) to join a new one (recipient).

As it can be seen from Table 1, the exact year corresponding to the transfer of the inventor cannot be determined with certainty. However, such year can be estimated in two different ways. The first method ("application year" rule or method, from now on to simplify) consists in simply retrieving the application year of the first patent filed at the new firm; therefore in the example presented in Table 1, "1999" will be considered the year of mobility. The second method instead ("mean year" rule or method from now on), considers the arithmetical average between the year of the last patent filed at the first firm (the source) and the year of the first patent filed at the second firm (the recipient), rounded up to the nearest integer. Considering Table 1, the mobility year for the inventor with ID=1, would be "1998" ((1996+1999)/2=1997.5, rounded up to 1998). Both methods will be carried on in the analysis.

4.2. Defining Startup Companies

The second step was to identify startups among all recipient firms. This process has been done for each recipient firm individuated among the mobility patterns of all moving individuals and it has been performed by comparing the recipient founding year with the year in which the inventor has filed a patent there for the first time. In other words, the aim was to individuate the age of the recipient firm when the inventor moved to it.

To calculate this, patent application year and founding year, which (the latter) has been retrieved from organizational information, have been confronted. Depending on age, it can be assessed if the inventor moved away from a source firm to join either an incumbent firm or a startup. As we all know, startups are newly established businesses. It is thus important to understand what the term "new" really means in terms of year after the inception. In order to overcome any sort of issue connected to the temporal definition of startups, this study simultaneously contemplates three different interpretations of startups. The first interpretation considers startups all firms that are three years old or less (3-year startups). The second one considers firms as startups if the age is five or below (5-year startups) and, lastly, the third one considers startups all firms that are seven or less (7-year startups).

Contingent unclear data have been treated differently from one another, depending on what they referred to. In case of "not found" or "not clear" information about firms' founding year, such firms have always been treated as incumbents when they have played the role of recipients. Instead, when the patent application year filed at the recipient has been noticed to be prior to the recipient firm's founding year, in this case, *if* either such difference has proved to be greater than "-3" or the patent was granted after the firm foundation, then the recipient firm, this notwithstanding, has been considered as a startup. If neither of the above both conditions were met, then the recipient firm would be considered as an incumbent.

Thanks to the information previously collected, it has been also possible to sort firms depending on their geographical location. In particular, the intention was to separate California organizations from organizations that are not based in California. In order to do so, every firm has been classified as a California or non-California firm, on the basis of its headquarters location. This study proposes itself to determine, among other things, if there is any regional difference among Indians' mobility rates. This because, ethnic associations as TiE, have been active *exclusively* in California for a limited amount of time, before spreading to other territories, therefore only influencing California inventors at the beginning. Hence, the interest to observe potential differences, if present, between California and non-California.

4.3. Mobility Rates

The information collected so far permitted the creation of line charts, which provided a first overall idea about the mobility trends affecting Indian entrepreneurs. In addition, the execution of a sensitivity analysis enabled a test on the robustness of the results. Such sensitivity analysis has been done by modifying the input data in the calculations and by showing the unaltered final results. But before this, here are the data that have been utilized to build the charts with the aforementioned trends.

ID	App. Year	Recipient Firm Name	Inventor Name	F. Year	Type (3 Years)	Type (5 Years)	Type (7 Years)	M. Year (Mean)	Headquarters
2	1992	GOODYEAR TIRE RUBBER COMPANY	MAJUMDAR, RAMENDRA	1898	incumbent	incumbent	incumbent	1988	Akron, OH, USA
976	1998	CONEXANT SYSTEMS INC	SHARMA, UMESH	1996	startup	startup	startup	1997	Irvine, CA, USA

Table 3: ID information

The data showed above in Table 3, are the same as Table 1, but with some additions that have enabled the sorting of firms, depending on their age, geographical location and so on. Table 3 is actually just a reduction of another larger table, which contains more data (Table 3_A in the appendix). Data in Table 3 contain: ID number, Application Year, Recipient Firm Name, Inventor Name, Founding Year, Type of firm (startup or incumbent) according to the three different definition

of startups (new firms with less than three, five or seven years), Year Mobility, calculated with the arithmetical average method and lastly, the headquarters location. The integration of this new data, put side by side with IDs, has contributed to the preparation of the ground for the construction of line charts.

Starting from this set of data, it has been possible to count the number of the moving individuals for each year, for every type of firm (incumbent or startup) and for both type of mobility year interpretation (explained above), sorted by state destination (California or non-California). These totals have been useful to calculate in turn the rates of Indian individuals moving either to incumbent or to startup. Indeed, by using such totals, which represent the total number of moving individuals, it has been possible to calculate mobility trends, just by dividing such totals by the total number of active (both moving and non-moving) individuals.

Needless to say that each moving quantity has to be divided by the total amount of active (moving and non-moving combined together) individuals in the same year and in the same geographical area. The resulting quotients will provide information about the mobility patterns of Indian inventors over the years. The below example, shows mobility trends of Indian inventors neither sorted by geographical region (California or non-California) nor by firm recipient type (incumbent or startup), but aggregate (Table 4).

	General (California/NO-California and incumbent/startup all combined)	
	General moving rate appyear **%**	General moving rate mean **%**
1975-1977	0,043	0,065
1978-1980	0,063	0,165
1981-1983	0,129	0,194
1984-1986	0,157	0,253
1987-1989	0,165	0,242
1990-1992	0,132	0,149
1993-1995	0,140	0,148

1996-1998	0,173	0,199
1999-2001	0,193	0,181
2002-2004	0,149	0,094
2005-2007	0,087	0,030
Total	0,157	0,157

Table 4: statistics on general moving individuals

Table 4 indicates the mobility rates of moving individuals, i.e. they refer to inventors who have left their previous firm to join another one, sorted by year. To be more precise, years have been aggregated in a three by three logic. The columns named "General moving rate appyear" and "General moving rate mean" indicate the proportion of moving individuals on the total number of active inventors, according to the mobility year determination rule. As for the former, the mobility years have been calculated following the "application year" rule, whereas for the latter, mobility years have been calculated following the "mean year" rule.

The decision to aggregate moving years by sets of three, simply responds to a need of simplicity. With the use of aggregate data, the final outcome of this part of the analysis, showed by line charts, provides a more immediate overview of the situation, without altering the conclusion that we would have had if data had not been modified. This is exactly what sensitivity analysis actually shows (later in this study).

	5 Year California			
	5Y California appyear incumbent rate	5Y California appyear startup rate	5Y California mean incumbent rate	5Y California mean startup rate
1975-1977	0,000	0,000	0,000	0,000
1978-1980	0,111	0,000	0,222	0,000
1981-1983	0,136	0,000	0,091	0,000
1984-1986	0,087	0,000	0,304	0,000
1987-1989	0,077	0,019	0,077	0,038
1990-1992	0,067	0,011	0,146	0,000
1993-1995	0,095	0,000	0,081	0,019
1996-1998	0,108	0,043	0,134	0,062

1999-2001	0,091	0,055	0,086	0,055
2002-2004	0,110	0,052	0,087	0,026
2005-2007	0,083	0,042	0,025	0,033
Total	0,098	0,041	0,098	0,041

Table 5: Indian inventors' mobility rates to California

Table 5 is an example depicting trends among Indian individuals moving to California. Different values are presented, depending on whether the destination firm is represented by an incumbent or a startup (when considering 5-year startups) and on whether individuals' mobility year has been calculated by using the "application year" method or the "mean year" method. A further example, representing the equivalent for individuals moving outside California, Table 5_A, is presented in the appendix, as well as the same comparisons for 3- and 7-year startups (Tables from 5_B to 5_E).

Chart 0 below, summarizes (5 years) startup and incumbent mobility rates, in and outside California, considering "mean year" rule. Chart 0_A (3Y startups) and 0_B (7Y startups) in the appendix.

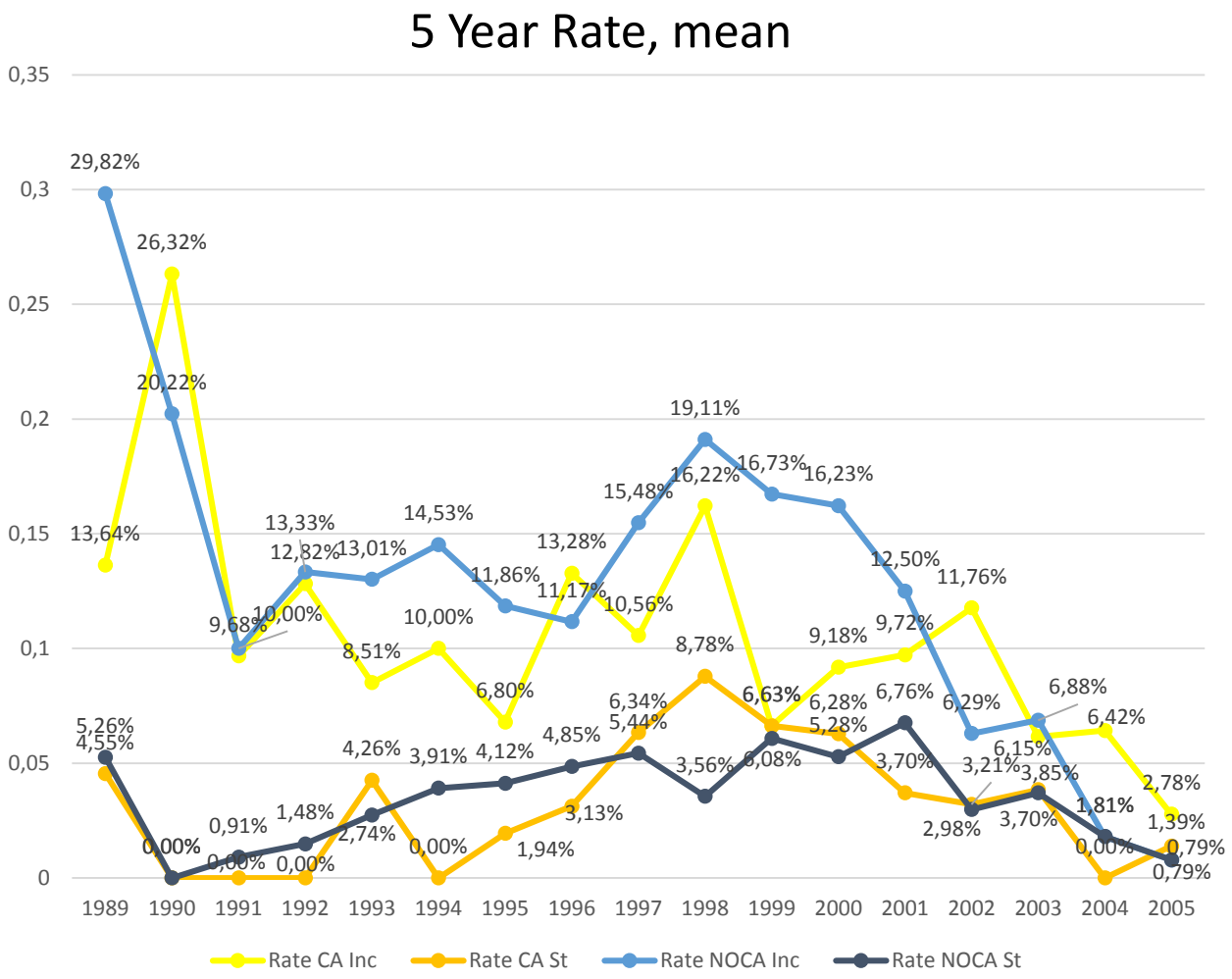


Chart 0: it summarizes the mobility rates of Indian inventors to startups in California (orange line), startups outside California (black line), incumbents in California (yellow line) and incumbents outside California (blue line). Some (less relevant) years have been left out by the chart to have a clearer view.

4.4. Sensitivity Analysis

The wide set of data has permitted to confront various types of phenomena occurring within the world of Indian inventors. One of the most interesting event seems to be the difference between individuals moving to startups in California and outside California. The chart below witnesses a curious occurrence: Indian inventors moving to startups have largely increased in California (yellow line), compared to their colleagues outside California (blue line), after 1992, foundation year of The Indus Entrepreneurs (Chart 1).

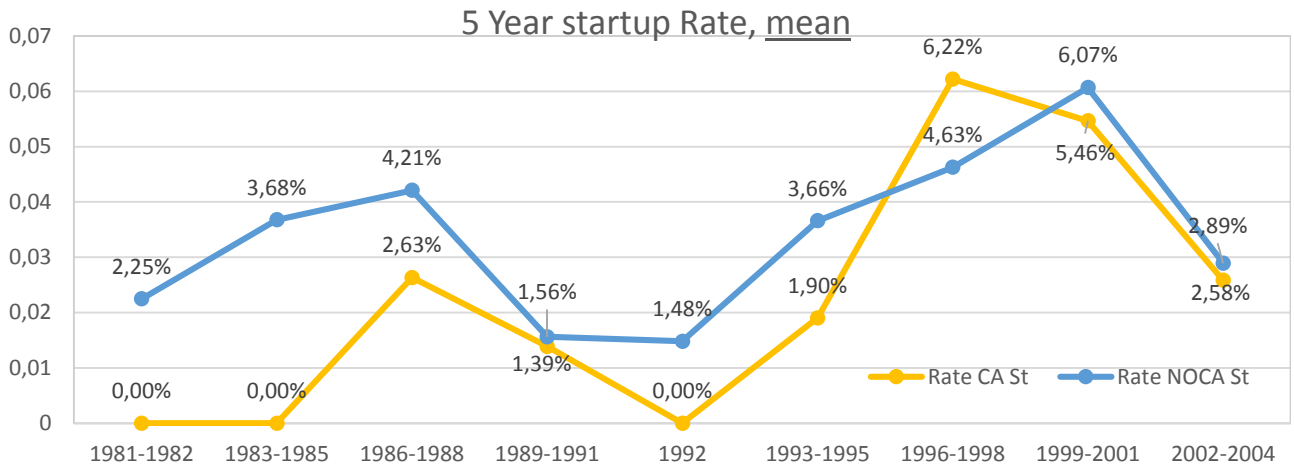


Chart 1: mobility trends for individuals moving to startups (5 years) in California and outside California

The result presented in the chart above constitutes the most interesting finding revealed so far. There seems to be a marked difference between the individuals moving to startups in California and the one moving to non-California startups. This phenomenon seems to have an even higher resonance if compared to the trends affecting individuals deciding to move to incumbent firms (Chart 2).

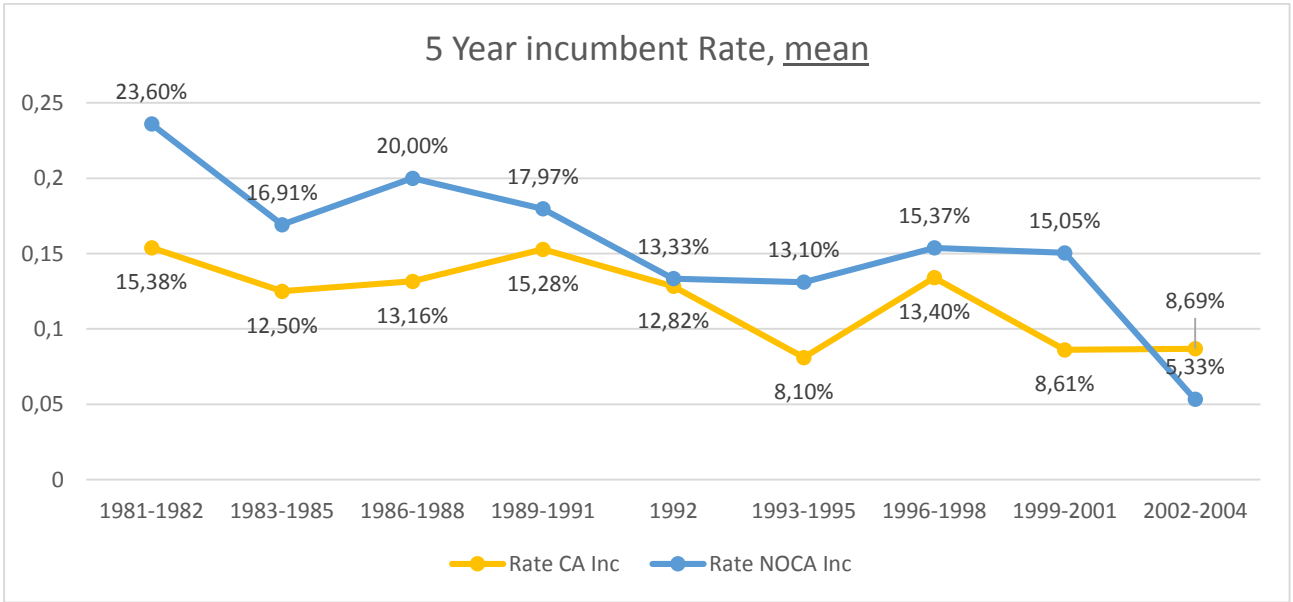


Chart 2: mobility trends for individuals moving to incumbents (considering startups 5 years old or less) in California and outside California

Chart 2 shows the trends regarding Indian inventors deciding to move to incumbents. Unlike Chart 1, there does not seem to be an increase of inventors' mobility rates in California after 1992 (founding year of TiE) but, on the contrary, a clear decrease. This is probably due to the fact that a larger part of the moving individuals has joined (or maybe also founded) a startup in the years after 1992, compared to other periods, and thereby people moving to incumbent are less. In order to remove any doubt about the consistency of these trends, a rapid sensitivity analysis will be performed. The aim of this sensitivity analysis is to show that even by adjusting or tweaking inputs and framework reference, the study provides the final same results. Such sensitivity analysis will be executed on Chart 1, which graphically shows the most important phenomenon individuated in the analysis on Indian inventors' mobility patterns.

In general terms, Chart 1 describes the rates of Indian inventors that moved to startups outside California and in California. However, the final overview of the outcome is always affected by the way such results are portrayed, this being valid for every study. As for this outcome, for instance, such aspects have to be considered: moving years are aggregated three by three, year "1992" (founding year of TiE) has been isolated from the rest, only the first mobility of each inventor has been taken into consideration, moving years have been calculated with the "mean year" method and lastly, startups are all five years old or less. Therefore the idea here is to modify these conditions and to demonstrate that, despite these alterations, the outcome does not change, always witnessing a higher increase in mobility rates for inventors moving to startups in California, rather than for those moving to startups outside California.

Considering Chart 1, year "1992" in the horizontal axis has been isolated from the rest of the years. This has been done to highlight the year in which "The Indus Entrepreneurs" was born, a sort of watershed in the way Indians engaged in entrepreneurship according to this study expectations.

By aggregating year “1992” with other years, the chart keeps on displaying the same trend (Chart 1_A).

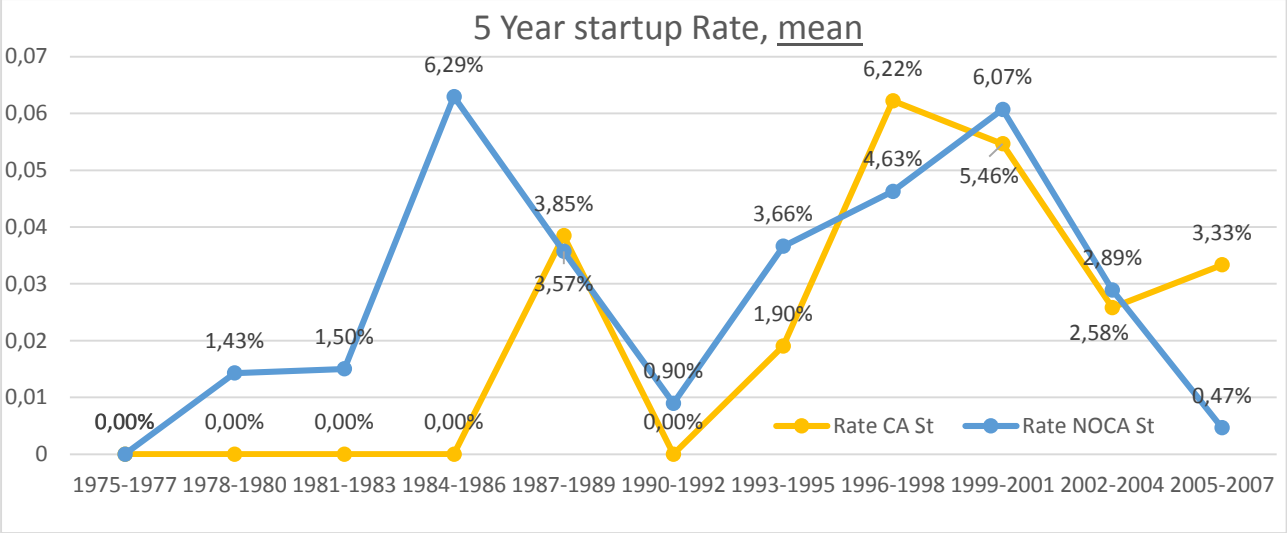


Chart 1_A: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), year 1992 not isolated

Considering Chart 1, years have been aggregated following a three by three logic. This aggregation has been made to compensate low values that may appear for those years exhibiting a low number of startups. However, even if such years are not aggregated or aggregated following a different logic (five by five), the final outcome stays the same, still showing a growth after 1992 with regard to the employees moving to startups in California (Chart 1_B and Chart 1_C in the appendix).

In this study, only the first mobilities have been taken into consideration. Therefore, if an individual first moves from firm A to firm B and then moves away again from firm B to firm C, this second transfer (from B to C) has not been contemplated so far. Yet, if we pretend that potential second mobilities (from B to C) can be interpreted as the transfer of other new moving inventors (new inventors, moving from A to B), we will have a higher number of moving employees but the effects will not be different (Chart 1_D).

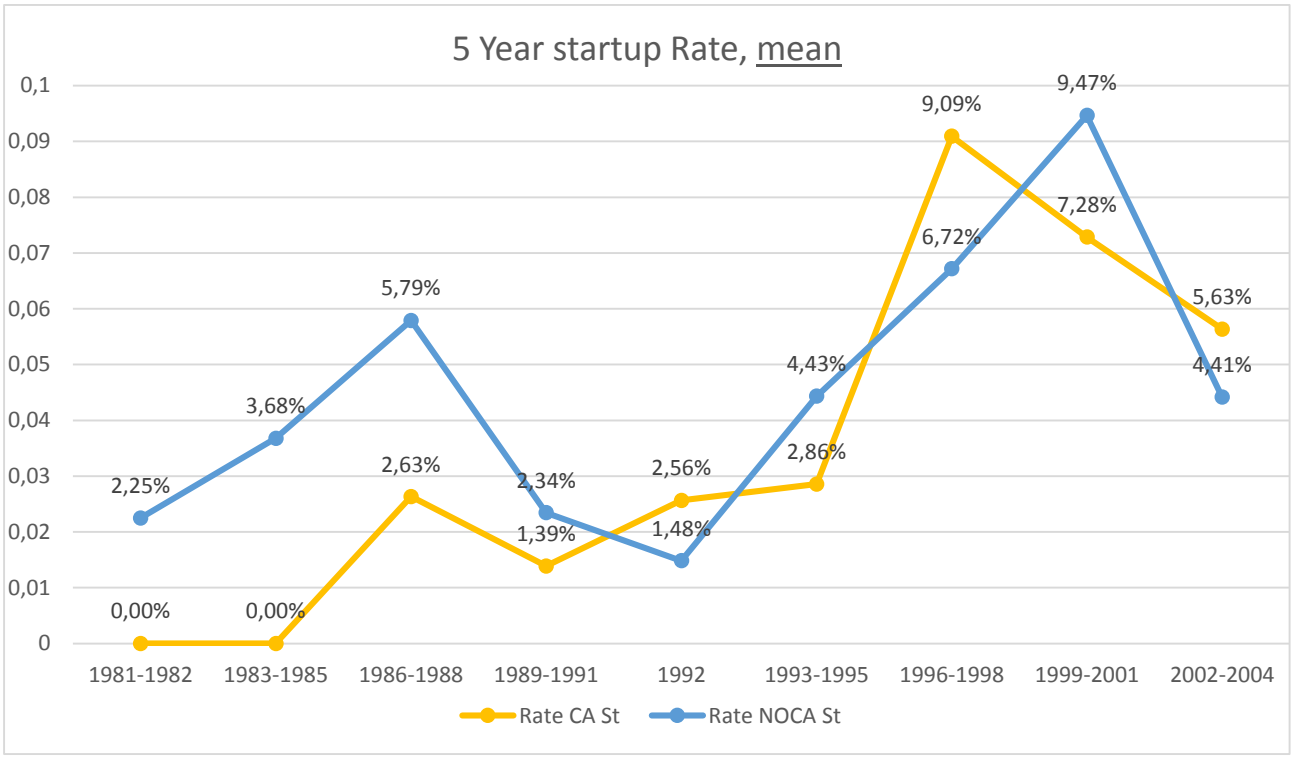


Chart 1_D: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), additional mobilities considered

If we consider Chart 1, this has been created by individuating the years in which individuals have moved through the "mean year" method. Yet, even by using the "application year" method, things do not change and Indian inventors in California still outdo their colleagues in other regions with regard to startup joining (Chart 1_E).

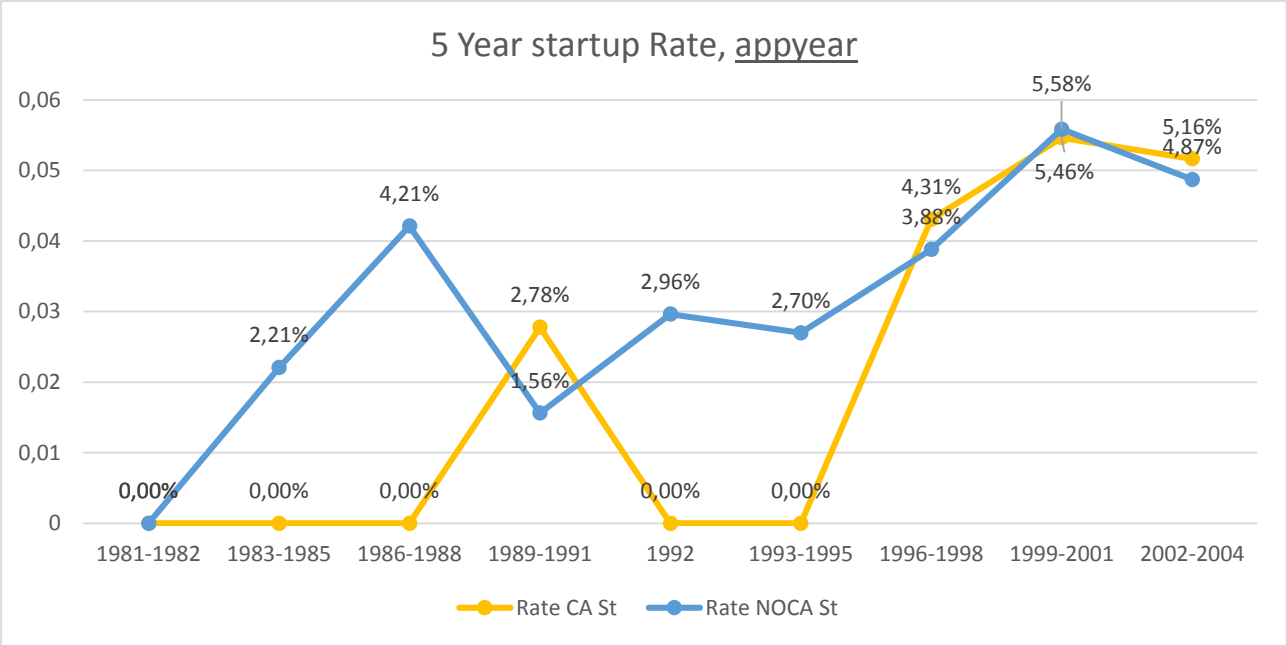


Chart 1_E: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), mobility years individuated through the "application year" method

Data in Chart 1 embrace the definition of startups related to a five-year timeframe. As already mentioned, this study simultaneously contemplates as startups, firms aged three or less, five or less or seven or less. No matter what definition is used to define startups, the charts will always show the same trends, as we can see from "Chart 1_F" (in the appendix) and "Chart 1_G" (in the appendix), which describe the same phenomenon as Chart 1.

4.5. Testing Differences

The impact of the sensitivity analysis is not secondary for the purposes of this study, since it has confirmed the lack of fortuity in the construction of the variables describing Indian inventors' mobility rates. However, this is not enough.

This study proposes itself to reveal the differences between moving individuals in different contexts and, therefore, in order to be able to individuate and measure such differences, an additional analysis is needed. Differences in mobility rate and in individual performances will be analyzed through the execution of t-tests and tests of proportions (pr tests).

The aim of this study is to observe potential differences both in the mobility rates of Indian inventors and in their individual performances. Starting from mobility rates, in order to concretely measure such differences, tests of proportions have been run on the mobility rates of moving, non-moving and moving to startups individuals.

For the sake of briefness, with regard to startups, only tests considering five-year startups will be displayed in the analysis, since tests conducted on three-year and seven-year startups show the same results as five-year startups.

Here is a test (Figure 1) examining the difference between moving and non-moving individuals. Basing on the data previously retrieved, a sharp difference is thus expected in favor of non-moving individuals. This test shows a *significant* difference between the variables.

```
. prtest moving==nonmoving

Two-sample test of proportions                    moving: Number of obs =     1960
                                                  nonmoving: Number of obs =     1960
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      moving |    .2107143   .0092116                      .1926598    .2287687
   nonmoving |    .7892857   .0092116                      .7712313    .8073402
-------------+----------------------------------------------------------------
        diff |   -.5785714   .0130272                     -.6041043   -.5530386
             |   under Ho:   .0159719   -36.22   0.000
------------------------------------------------------------------------------
        diff = prop(moving) - prop(nonmoving)                     z = -36.2243
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 1.0000
```

Figure 1: pr test between moving and non-moving individuals

We have also discussed about the possible differences between regions in the mobility of Indian inventors. California is expected to register a higher proportion of moving individuals, mainly because of its vibrant economic environment. Here conditions are expected less static compared to other states and, consequently, such dynamism should reflect itself even within phenomena like employee mobility. In fact, in Figure 2, a *significant* difference can be seen in the proportion between California and non-California movers.

```
. prtest moving, by (calif)

Two-sample test of proportions                    0: Number of obs =     1210
                                                  1: Number of obs =      750
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |    .1628099   .0106135                      .1420078    .1836121
           1 |        .288   .0165351                      .2555919    .3204081
-------------+----------------------------------------------------------------
        diff |   -.1251901   .0196483                        -.1637   -.0866802
             |   under Ho:   .0189526    -6.61   0.000
------------------------------------------------------------------------------
        diff = prop(0) - prop(1)                                  z =  -6.6054
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 1.0000
```

Figure 2: pr test between moving individuals in non-California (0) and California (1)

According to the intense influence originated by the inception of ethnic associations in California, a difference between individuals moving to startups before 1992 and those moving to startups after 1992 is therefore expected. In this test, startups proportion is calculated on the total amount of *moving* individuals. The result is presented in Figure 3, and fails to meet the predetermined expectations.

```
. prtest mob_startup5 if calif==1, by (post)

Two-sample test of proportions                    0: Number of obs =       11
                                                  1: Number of obs =      205
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |    .3636364   .1450407                      .0793617     .647911
           1 |    .2634146   .0307648                      .2031167    .3237126
-------------+----------------------------------------------------------------
        diff |    .1002217   .1482676                     -.1903775    .3908209
             |  under Ho:    .1371647     0.73   0.465
------------------------------------------------------------------------------
        diff = prop(0) - prop(1)                                      z =   0.7307
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.7675         Pr(|Z| < |z|) = 0.4650          Pr(Z > z) = 0.2325
```

Figure 3: pr test regarding inventors moving to startups within California, pre (0) and post (1) 1992

However, other expected differences have been observed as for startups, like the *significant* difference between the proportion of startups in California and outside California after 1992 (Figure 4). This time, startups proportion has been instead calculated on the total amount of active individuals (both moving and non-moving). The same test can be found in the appendix for three-year and seven-year startups (Figure 4_A and Figure 4_B).

```
. prtest mobst5onNonm if post==1, by (calif)

Two-sample test of proportions                    0: Number of obs =     1062
                                                  1: Number of obs =      712
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |    .047081   .0064996                      .0343419      .05982
           1 |   .0758427   .0099218                      .0563964     .095289
-------------+----------------------------------------------------------------
        diff |  -.0287617   .0118612                     -.0520092   -.0055143
             |  under Ho:   .0113788    -2.53   0.011
------------------------------------------------------------------------------
       diff = prop(0) - prop(1)                                      z =  -2.5277
   Ho: diff = 0

   Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
Pr(Z < z) = 0.0057         Pr(|Z| < |z|) = 0.0115          Pr(Z > z) = 0.9943
```

Figure 4: pr test after 1992 between startups outside California (0) and in California (1)

Similarly, without specifying temporal conditions, the proportion of individuals moving to startups is greater in California than in non-California, as it can be seen from the *significant* difference in Figure 5.

```
. prtest mobst5onNonm, by (calif)

Two-sample test of proportions                    0: Number of obs =     1210
                                                  1: Number of obs =      750
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |   .0446281   .0059361                      .0329936    .0562625
           1 |   .0773333   .0097538                      .0582162    .0964505
-------------+----------------------------------------------------------------
        diff |  -.0327052   .0114181                     -.0550844   -.0103261
             |  under Ho:   .0107872    -3.03   0.002
------------------------------------------------------------------------------
       diff = prop(0) - prop(1)                                      z =  -3.0319
   Ho: diff = 0

   Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
Pr(Z < z) = 0.0012         Pr(|Z| < |z|) = 0.0024          Pr(Z > z) = 0.9988
```

Figure 5: pr test between startups calculated on the total number of active individuals, between non-California (0) and California (1)

The tests that have been conducted on inventors' individual performances have the goal to unveil possible differences between moving and non-moving people. The literature, in fact, offers a wide variety of studies highlighting such differences, between people moving to startups and people moving to incumbent, for example. Several performance indicators have been tested by this study. First, patents, specifically the number of filed patent per employee per year of activity, a useful measure to determine the productivity of inventors. Second, forward citations that have been received by each inventor per patent, tested to assess the relevance of inventors activity. This indicator has been evaluated within different dimensions, i.e. not only considering plain forward citations, but also forward self citations, forward citations within five years from the patent publication and these two dimensions combined, i.e. forward self-citations within five years from the patent publication. Third, back citations, analyzed using the same dimensions as for forward citations. Back citations represent instead valid indicators for the scope of knowledge intrinsic to patents. Fourth, claims per patent, which express the magnitude of innovativeness within patents. Findings about these performance indicators reveal some interesting fact.

In short, t-tests have showed significant differences in the productivity of inventors, with regard to patent publishing activity. Indeed, inventors who moved after 1992 tend to file more patents than inventors who moved before 1992 (Figure 6) and same thing for inventors who moved outside California, who patent more than inventors moving to California (Figure 7). Furthermore, individuals moving to startups outside California display a higher number of patents compared to those who move to incumbents (Figure 8).

```
. ttest patent if moving==1, by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	319	1.667712	.0696974	1.244835	1.530585	1.804838
1	1815	2.340496	.0741237	3.157879	2.195119	2.485873
combined	2134	2.239925	.0641044	2.96132	2.114211	2.365639
diff		-.6727843	.179234		-1.024276	-.3212926

```
    diff = mean(0) - mean(1)                                      t =  -3.7537
Ho: diff = 0                                     degrees of freedom =     2132

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0001         Pr(|T| > |t|) = 0.0002          Pr(T > t) = 0.9999
```

Figure 6: t-test regarding the number of patents per employee per activity year, only considering moving employees, sorted by pre (0) or post (0) 1992

```
. ttest patent if moving==1, by (calif)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	1289	2.363072	.0944356	3.390487	2.177808	2.548337
1	845	2.052071	.0734707	2.135712	1.907864	2.196278
combined	2134	2.239925	.0641044	2.96132	2.114211	2.365639
diff		.3110011	.130935		.0542276	.5677747

```
    diff = mean(0) - mean(1)                                      t =   2.3752
Ho: diff = 0                                     degrees of freedom =     2132

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9912         Pr(|T| > |t|) = 0.0176          Pr(T > t) = 0.0088
```

Figure 7: t-test regarding the number of patents per employee per activity year, only considering moving employees, sorted by non-California (0) or California (1)

```
. ttest patent if realmoving==1 & calif==0, by ( mob_startup5)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	158	1.518987	.0749756	.9424289	1.370896	1.667078
1	56	1.910714	.1824736	1.365507	1.545029	2.2764
combined	214	1.621495	.0738121	1.079778	1.476	1.766991
diff		-.3917269	.1661579		-.7192603	-.0641936

```
    diff = mean(0) - mean(1)                                      t =  -2.3576
Ho: diff = 0                                     degrees of freedom =      212

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0097         Pr(|T| > |t|) = 0.0193          Pr(T > t) = 0.9903
```

Figure 8: t-test regarding the number of patents per employee per activity year, only considering moving employees to non-California, sorted by incumbent (0) or startups (1)

As for the other performance indicators instead, more forward citations per patent are received by inventors moving before 1992, compared to those who moved after 1992. The difference between the two groups is *significant* (Figure 9).

```
. ttest forw_p if realmoving==1 & mob_startup5==0 , by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	27	17.42284	2.551608	13.25854	12.17793	22.66774
1	251	8.939354	1.107003	17.53822	6.759114	11.11959
combined	278	9.763289	1.039579	17.33324	7.716811	11.80977
diff		8.483486	3.479703		1.633356	15.33362

```
    diff = mean(0) - mean(1)                                      t =   2.4380
Ho: diff = 0                                     degrees of freedom =      276

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9923         Pr(|T| > |t|) = 0.0154          Pr(T > t) = 0.0077
```

Figure 9: t-test regarding forward citations per patent received by moving to incumbent inventors pre (0) and post (1) 1992

Concerning back citations instead, individuals moving to incumbents make larger use of backward self-citations than those moving to startups. Same finding for the backward self-citations not older than five years. Considering backward citations to five years old (or more recent) patents, thereby excluding self-citations, individuals moving to startups make larger use of five-year backward citations compared to those who move to incumbents. All tests show a significant different between the two groups of movers (Figure 10 below, Figure 10_B and Figure 10_C in the appendix).

```
. ttest back_sc_p if realmoving==1, by ( mob_startup5)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	278	1.128357	.170493	2.842687	.7927307	1.463984
1	105	.2470068	.0673712	.690349	.1134073	.3806064
combined	383	.8867338	.1266604	2.478793	.637695	1.135773
diff		.8813505	.2807013		.3294327	1.433268

```
    diff = mean(0) - mean(1)                                      t =   3.1398
Ho: diff = 0                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9991         Pr(|T| > |t|) = 0.0018          Pr(T > t) = 0.0009
```

Figure 10: t-test concerning backward self-citations per patent done by moving individuals to incumbents (0) and to startups (1)

And lastly, inventors moving to incumbents after 1992 tend to file patents owning more claims than those moving before 1992 (Figure 11). The test shows a *significant* difference between the groups. However, considering moving employees, those who display more claims per patent are

those who move to 3-year startups and not incumbents. Also in this case, the difference is *significant* (Figure 12).

```
. ttest claims_p if realmoving==1 & mob_startup5==0 , by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	27	13.23457	2.329808	12.10604	8.44558	18.02356
1	251	23.32118	.9029305	14.30511	21.54286	25.0995
combined	278	22.34155	.863737	14.40137	20.64122	24.04187
diff		-10.08661	2.858315		-15.71348	-4.459747

```
    diff = mean(0) - mean(1)                                      t =  -3.5289
Ho: diff = 0                                     degrees of freedom =      276

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0002         Pr(|T| > |t|) = 0.0005          Pr(T > t) = 0.9998
```

Figure 11: t-test concerning claims per patent for individuals moving to incumbent pre (0) and post (1) 1992

```
. ttest claims_p if realmoving==1, by ( mob_startup3)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	302	21.87456	.8118474	14.1084	20.27694	23.47217
1	81	25.68739	1.956729	17.61056	21.79338	29.5814
combined	383	22.68093	.7651353	14.97399	21.17652	24.18533
diff		-3.812831	1.865922		-7.481625	-.1440375

```
    diff = mean(0) - mean(1)                                      t =  -2.0434
Ho: diff = 0                                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0208         Pr(|T| > |t|) = 0.0417          Pr(T > t) = 0.9792
```

Figure 12: t-test concerning claims per patent for employees moving to incumbent (0) and to 3-year startups (1)

For the sake of briefness, the tests presented here are only part of the numerous tests undertaken in the analysis. Others, albeit not all, have been put in the appendix, starting with Figure 13. These all report a significant difference between the groups and are amongst the most important ones.

5. Discussion

The results obtained in the analysis show some intriguing differences among Indian inventors' mobility rates and performances, only partly in line with the expectations previously formulated in this study.

As for mobility rates, this study has showed the unvaried greater proportion of non-moving individuals in comparison to moving individuals (Figure 1), irrespective of the period (post or pre 1992) and location (California or non-California). Chart 1 has showed a sharper increase of Indian inventors' mobility to startups in California after 1992, compared to those moving to startups outside California. This trend has led to the formulation of expectations about the presence of important differences between mobility rates to startups in California before vs. after 1992. A positive result in such test would provide at least a signal of change in the environment under analysis (California).

However, according to Figure 3, these expectations have not been met, underlying the impossibility to determine the entity of the change in this specific circumstance, despite the clear trend evidencing the increase of startups in Chart 1. However, some positive phenomena concerning the favorable conditions to engage in entrepreneurship stand out in California (Figure 4). In fact, a difference concerning mobility rates to startups after 1992 has been revealed, establishing the fact that Indian inventors are more likely to join new ventures in California than in other states (7.58% vs 4.71% out of the total active individuals).

These findings suggest that there are actually some positive conditions favoring employees' mobility in California more than in other places. California's most innovative and vibrant areas, like Silicon Valley, undoubtedly play an important role in this phenomenon, not only favoring employees' mobility, but also fostering the engagement in entrepreneurial activities. Therefore, part of the expectations drawn up in this study seems to be met, since Indian inventors have showed

a higher tendency to join startups in California than in the rest of the states. Certainly, associations fostering entrepreneurship have had an impact in California, especially considering how many Indian inventors have joined startups, yet it would be interesting to measure the extent of this contribution to understand the phenomenon in its whole.

Patent analysis has contributed to the understanding of the productivity of each Indian inventor. Results suggest that individuals who moved after 1992 registered a higher number of patents per period of activity compared to the ones who moved before, 2.34 vs. 1.67 patents each (Figure 6). A greater number of patents is also published by inventors working outside California rather than by those who work in California (Figure 7). On average, non-California inventors produce 0.31 patents each more than California inventors. Considering startups instead, it can be said that outside California, those who move to startups issue more patents than those who move to incumbents (Figure 8), with an average of 1.91 vs. 1.52 patents per inventor. This information, generated by the analysis, permits to individuate some trends regarding the activity of patent publication among Indian inventors.

Results show that in general, the activity of Indian individuals is more prolific after 1992. This is probably linked to the generic favorable economic conditions emerged in the very last years of the century and in the first years of 2000's. Considering how developed and in the vanguard California is in terms of innovation, what perhaps is more surprising is the fact that inventors outside California tend to patent more than in California. In sum, California does not outdo other regions as for patent publication, maybe because California excels in the quality and not in the quantity of such publication. Concerning startups instead, regardless of the year definition utilized, it can be clearly said that outside California, people moving to startups patent more than people moving to incumbents.

As for the other performance indicators, the outcome of the study present variegated differences among Indian inventors, depending on the different variables considered in the tests.

However, major tendencies seem to emerge with regard to forward citations, backward citations and claims in general. First of all, no differences have been observed for forward self-citations, backward citations in general (thereby excluding self-citations and time limit) and for both forward and forward self-citations, received in the five years after the publication of the patent.

Considering people moving to incumbent, more forward citations are received by these inventors before 1992 than after 1992 (Figure 9). This is probably due to the fact that patent issued before 1992 are older and thus had a more wide time window to receive forward citations by posterior patents. In fact, data reveal 17.42 forward citations per patent for individuals moving to incumbents versus 8.94 forward citations for individuals moving to startups.

Differences in backward self-citations and backward self-citations five years before the patent issue date are exactly the same for Indian moving inventors. Specifically, it has been seen that the individuals moving to incumbents cite back other patents more largely than individuals moving to startups, regardless of geographical and time conditions (Figure 10; Figure 10_B in the appendix). These results indicate that those who decide to join an incumbent firm rely more on knowledge embedded in patents made by others, unlike those who decide to join a startup. Probably, this finding tells us about the use of existing knowledge that the different typologies of firms use. Startups might rely less on existing knowledge, maybe because their orientation is more focused on the future.

On the contrary backward citations (thereby without considering self-citations) to patents issued five years before, seem to be higher for those inventors who move to startups and not incumbent (Figure 10_C in the appendix). This result seems to be counterintuitive if compared to the previous results on the other types of backward citations. Yet, if self-citations are excluded, it can be supposed that when startups draw on existing knowledge, they tend to rely more on the knowledge embedded in the patents that are chronologically closer, compared to incumbents. That

is why, perhaps, backward citations within five years are used more largely by startup and not incumbent movers.

As for claims, data show a higher number of claims per patent for Indian inventors moving to incumbents after 1992 than those moving before 1992 (Figure 11). Claims can represent a measure for a patent innovativeness and therefore, the fact that post 1992 patents exhibit more numerous claims might contribute to the idea of a general improvement in the number of innovations in the last years of the 90's and beyond.

6. Conclusion

This study has analyzed Indian inventors' mobility in the US, paying particular attention to the influence of ethnic communities on mobility to entrepreneurship. The investigation on ethnic communities has firstly revealed the importance of social capital among its members and secondly the capacity to create new institutions able to positively condition entrepreneurial activities. Data collected from Indian inventors' patents in the semiconductor industry, have unveiled very interesting mobility trends. In fact, data showed an increase in the mobility rates to startups in California just right after the inception of an important association fostering entrepreneurship in California, "The Indus Entrepreneurs" (TiE).

Several checks, as sensitivity analysis, have been run on these trends before testing the expectations that had emerged. The main expectation was about the difference within California in the mobility rates to startups before and after 1992, founding year of TiE. The test on this specific expectation did not provide the expected results, however other findings have emerged. Indian inventors moving after 1992 are more likely to join a startup in California than outside California.

Furthermore, this study has concentrated in parallel on the analysis of the performance of Indian inventors depending on mobility characteristics. Many studies in the literature have proved

the existence of various individual characteristics differentiating employees according to their mobility patterns. The implementation of t-tests to assess the differences in the performances of the Indian inventors has led to important findings regarding patents, forward citations, backward citations and claims.

6.1. Limitations and Future Research

This study presents some limitations. First, the individuation of the year of mobility, albeit well approximated thanks the use of two methods, has not been established with a 100% sureness. Yet, this is a common limit, shared by all researchers that aim to study individuals' mobility by the use of patents. Same thing for the individuation of innovation embedded within patents. Publishing a patent represents actually a strategic choice, therefore not all inventors decide to patent their innovation and, moreover, tacit knowledge cannot be patented, thereby only codified knowledge finds its place within patents. Secondly, this study does not consider the proportion of Indian inventors concretely making use of ethnic associations. It would be interesting to know the percentage, among all Indian inventors, of people seeking help from organization like TiE. This practice would give a more complete overview of the phenomenon. Thirdly, this study does not consider the potential effect of the launch of similar associations in other territories.

Future research could therefore take cue from the limitations here presented or engage in other unexplored areas of the phenomenon analyzed in this study. It would be interesting to know the destiny of the new businesses created by ethnic associations and the extent to which employees who joined startups represent at the same time the founders of those startups.

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7.2. Databases

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7.3. Websites

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8. Appendix

8.1. ID Information

Table 3_A:

ID	App. Year	Recipient firm name	Firm Identification Code	Inventor Name	Patent	Grant Year	Founding Year
2	1992	GOODYEAR TIRE RUBBER COMPANY	114523	MAJUMDAR, RAMENDRA NATH	5397519	1995	1898
976	1998	CONEXANT SYSTEMS INC	65956	SHARMA, UMESH	6339000	2002	1996

ID	Firm Age	Type (3 Years)	Type (5 Years)	Type (7 Years)	Mobility Year (Mean)	Headquarters recipient	Industry
2	94	incumbent	incumbent	incumbent	1988	Akron, OH, USA	Manufacturing
976	2	startup	startup	startup	1997	Irvine, CA, USA	Semiconductor company

ID	Size	Application Year	Source Firm Name	Firm Identification Number	Headquarters Source Firm
2	67,000[1] (2015)	1983	UNIVERSITY OF AKRON	20544	Akron, OH, USA
976	312 (2014)	1996	MOTOROLA INC	183023	Schaumbu Schaumburg, IL, USA

“Table 3_A” presents the ensemble of the information used to analyze data. The original Excel file from which this data have been retrieved, also contains other cells for each ID, yet worthless, since these additional cells only contain partial operations or notes utilized to obtain the final data. Furthermore, to be precise, these rows have been cut and separated into three images in order to be better visible.

8.2. Mobility Trends

Table 5_A

	5 Year NO-California			
	5Y California appyear incumbent rate	5Y California appyear startup rate	5Y California mean incumbent rate	5Y California mean startup rate
1975-1977	0,045	0,000	0,068	0,000
1978-1980	0,057	0,000	0,143	0,014
1981-1983	0,120	0,008	0,195	0,015
1984-1986	0,147	0,021	0,182	0,063
1987-1989	0,143	0,041	0,240	0,036
1990-1992	0,126	0,021	0,141	0,009
1993-1995	0,131	0,027	0,131	0,037
1996-1998	0,148	0,039	0,154	0,046
1999-2001	0,172	0,056	0,150	0,061
2002-2004	0,091	0,049	0,053	0,029
2005-2007	0,042	0,023	0,009	0,005
Total	0,129	0,037	0,129	0,037

Table 5_A describes Indian inventors' mobility rates outside California. These data have been sorted, differentiating those who move to join an incumbent from those who move to join a startup. An additional differentiation has been marked, the one regarding the method used to determine the mobility year, the "application year" rule vs. the "mean year" rule.

Table 5_B

	3 Year California			
	3Y California appyear incumbent rate	3Y California appyear startup rate	3Y California mean incumbent rate	3Y California mean startup rate
1975-1977	0,000	0,000	0,000	0,000
1978-1980	0,111	0,000	0,222	0,000
1981-1983	0,136	0,000	0,091	0,000
1984-1986	0,087	0,000	0,304	0,000

1987-1989	0,096	0,000	0,096	0,019
1990-1992	0,067	0,011	0,146	0,000
1993-1995	0,095	0,000	0,086	0,014
1996-1998	0,117	0,033	0,144	0,053
1999-2001	0,101	0,045	0,101	0,040
2002-2004	0,122	0,040	0,092	0,021
2005-2007	0,092	0,033	0,025	0,033
Total	0,106	0,032	0,106	0,032

Table 5_B describes Indian inventors' mobility rates to California, sorted by incumbent and startups (3 years) and by mobility year definition.

Table 5_C

	3 Year NO-California			
	3Y NOCalifornia appyear incumbent rate	3Y NOCalifornia appyear startup rate	3Y NOCalifornia mean incumbent rate	3Y NOCalifornia mean startup rate
1975-1977	0,045	0,000	0,068	0,000
1978-1980	0,057	0,000	0,143	0,014
1981-1983	0,120	0,008	0,211	0,000
1984-1986	0,161	0,007	0,217	0,028
1987-1989	0,163	0,020	0,240	0,036
1990-1992	0,132	0,015	0,144	0,006
1993-1995	0,137	0,021	0,141	0,027
1996-1998	0,154	0,033	0,160	0,040
1999-2001	0,184	0,044	0,167	0,044
2002-2004	0,104	0,037	0,059	0,023
2005-2007	0,056	0,009	0,014	0,000
Total	0,139	0,028	0,139	0,028

Table 5_C describes Indian inventors' mobility rates to non-California, sorted by incumbent and startups (3 years) and by mobility year definition.

Table 5_D

	7 Year California			
	7Y California appyear incumbent rate	7Y California appyear startup rate	7Y California mean incumbent rate	7Y California mean startup rate
1975-1977	0,000	0,000	0,000	0,000
1978-1980	0,111	0,000	0,222	0,000
1981-1983	0,136	0,000	0,091	0,000
1984-1986	0,087	0,000	0,261	0,043
1987-1989	0,058	0,038	0,077	0,038
1990-1992	0,067	0,011	0,146	0,000
1993-1995	0,090	0,005	0,071	0,029
1996-1998	0,103	0,048	0,129	0,067
1999-2001	0,089	0,056	0,084	0,056
2002-2004	0,103	0,059	0,082	0,031
2005-2007	0,083	0,042	0,025	0,033
Total	0,094	0,045	0,094	0,045

Table 5_D describes Indian inventors' mobility rates to California, sorted by incumbent and startups (7 years) and by mobility year definition.

Table 5_E

	7 Year NO-California			
	7Y California appyear incumbent rate	7Y California appyear startup rate	7Y California mean incumbent rate	7Y California mean startup rate
1975-1977	0,045	0,000	0,068	0,000
1978-1980	0,057	0,000	0,143	0,014
1981-1983	0,120	0,008	0,180	0,030
1984-1986	0,140	0,028	0,182	0,063
1987-1989	0,133	0,051	0,214	0,061
1990-1992	0,108	0,039	0,135	0,015
1993-1995	0,131	0,027	0,129	0,039
1996-1998	0,146	0,040	0,149	0,051
1999-2001	0,167	0,061	0,147	0,064
2002-2004	0,088	0,052	0,052	0,030
2005-2007	0,037	0,028	0,009	0,005
Total	0,125	0,042	0,125	0,042

Table 5_C describes Indian inventors' mobility rates to non-California, sorted by incumbent and startups (7 years) and by mobility year definition.

8.3. Mobility Line Charts

Chart 0_A

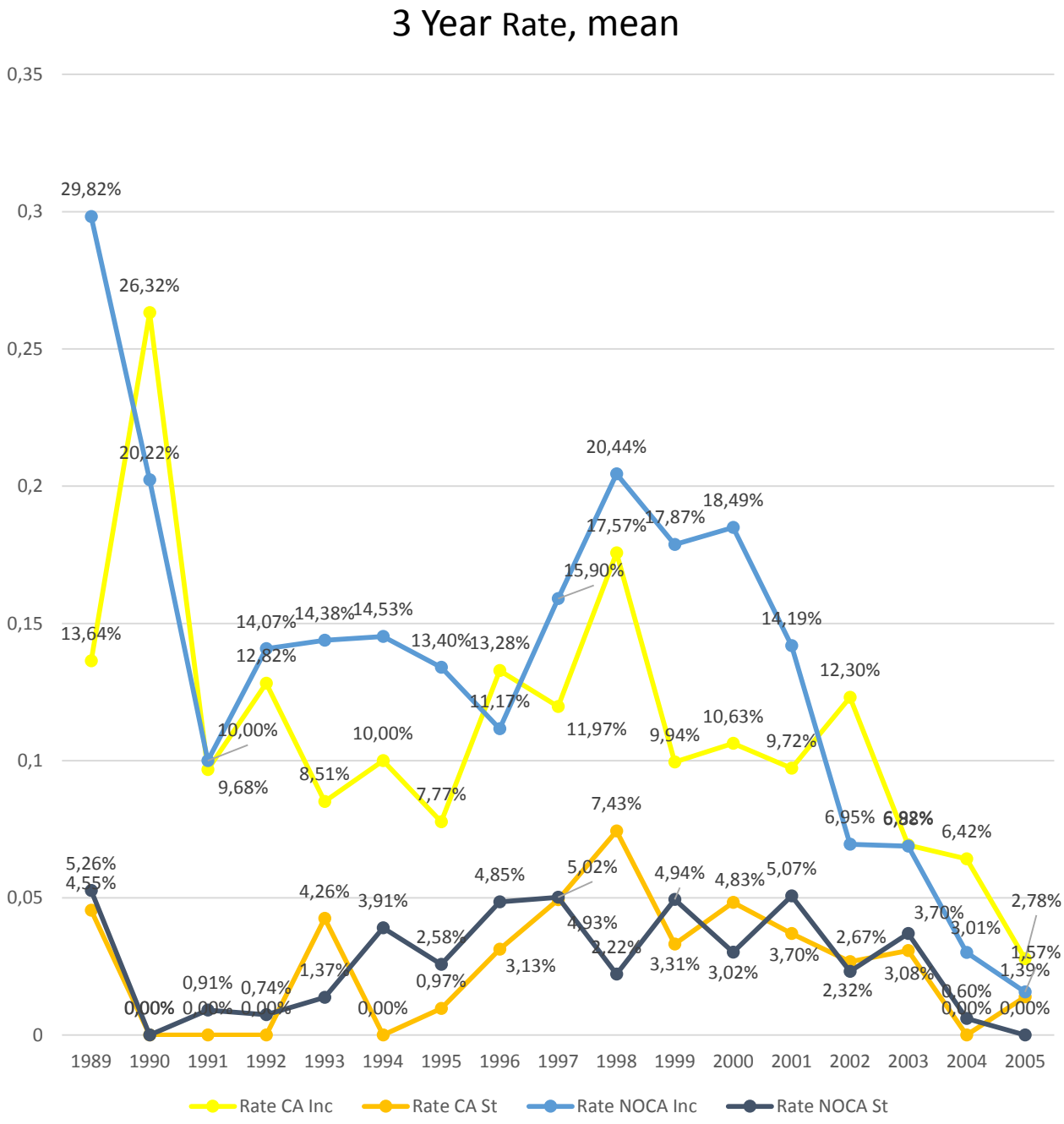

Chart 0_A: it summarizes California and non-California startup and incumbent mobility rates, considering 3-year startup definition and "mean year" rule.

Chart 0_B

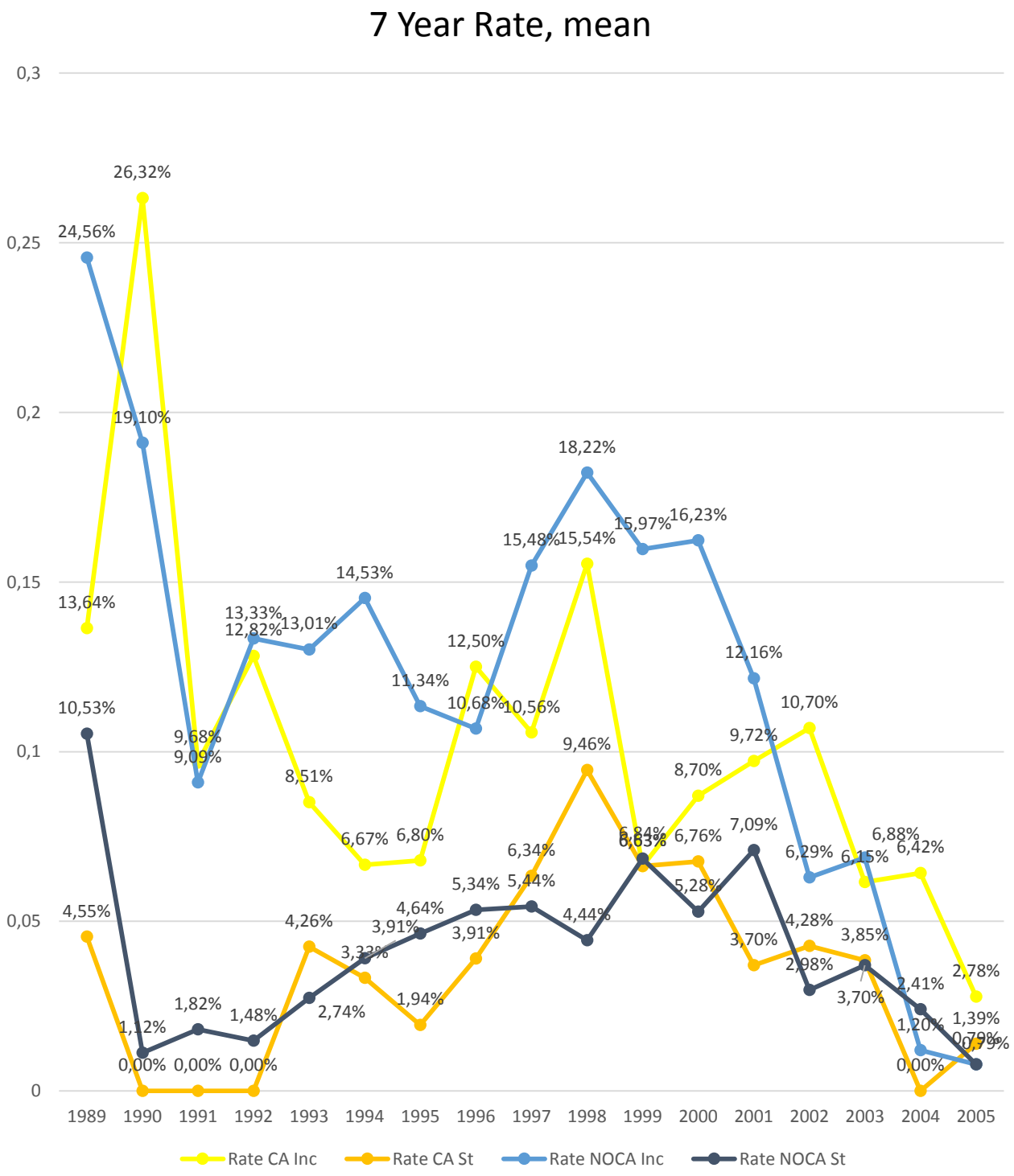

Chart 0_B: *it summarizes California and non-California startup and incumbent mobility rates, considering 7-year startup definition and "mean year" rule.*

Chart 1_B

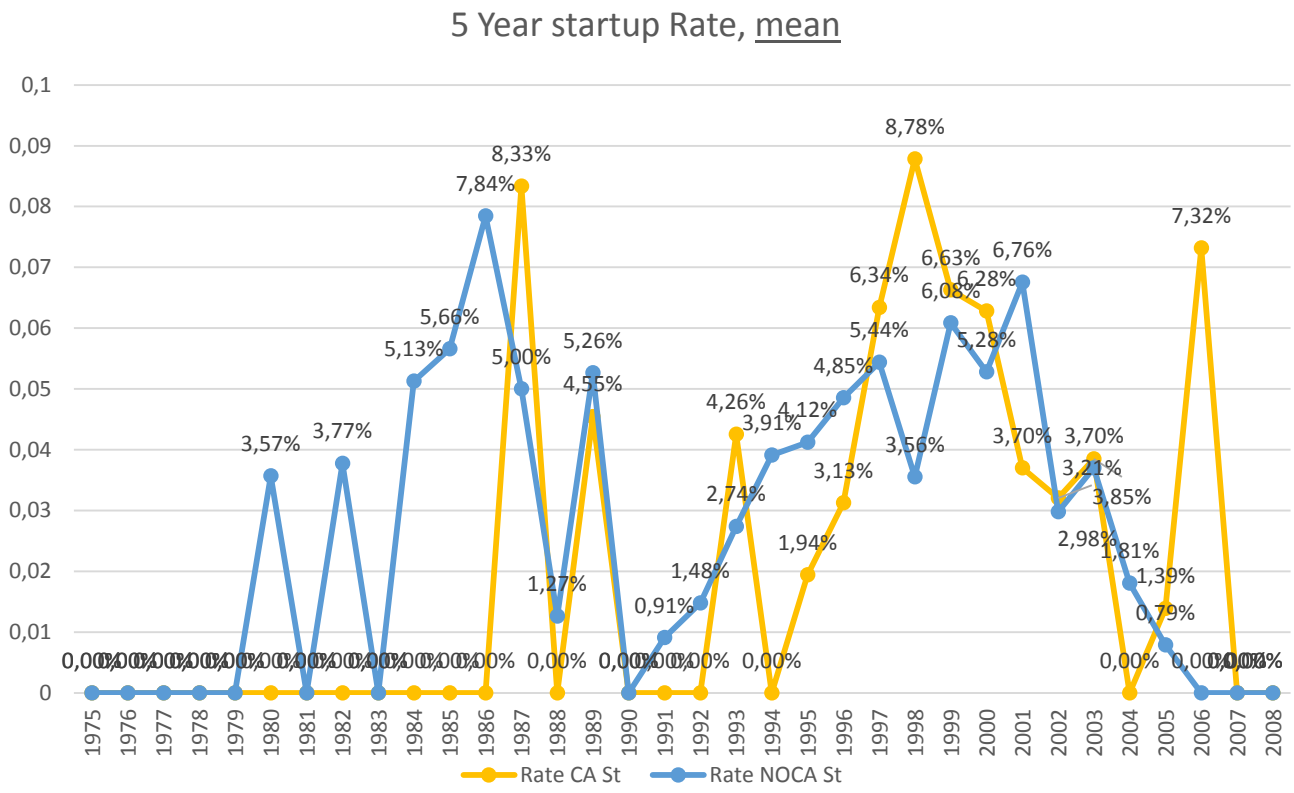

Chart 1_B: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), no aggregate years

Chart 1_C

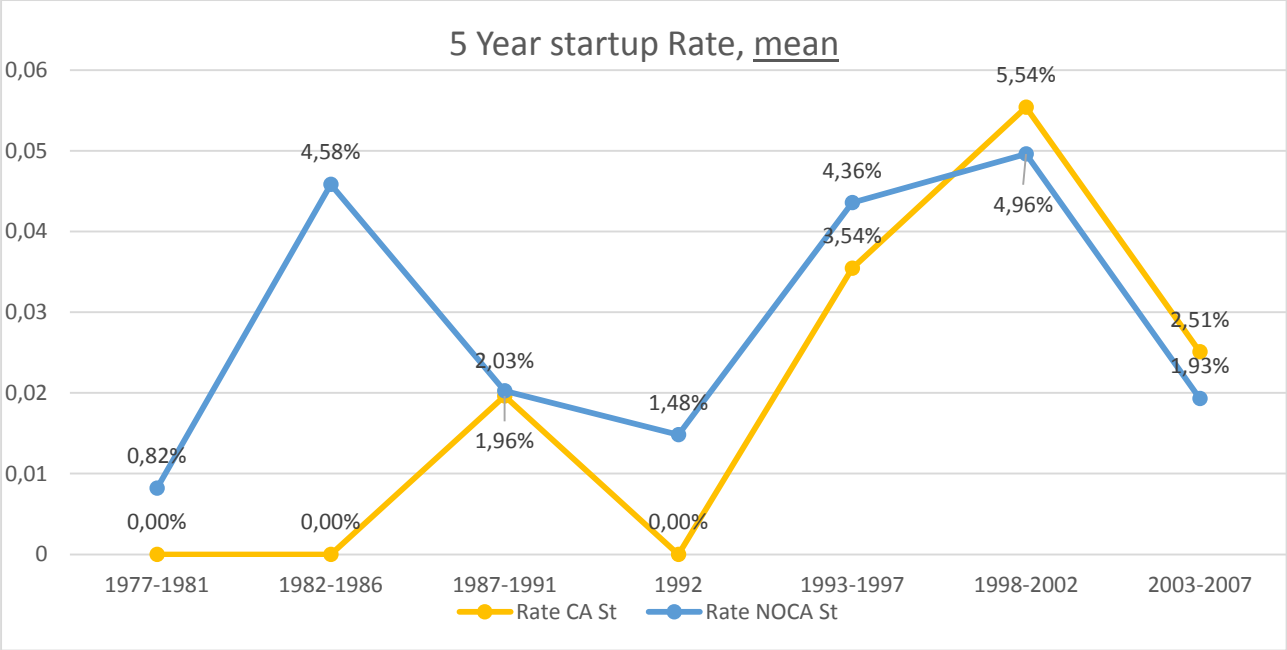

Chart 1_C: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), five by five aggregate years

Chart 1_F

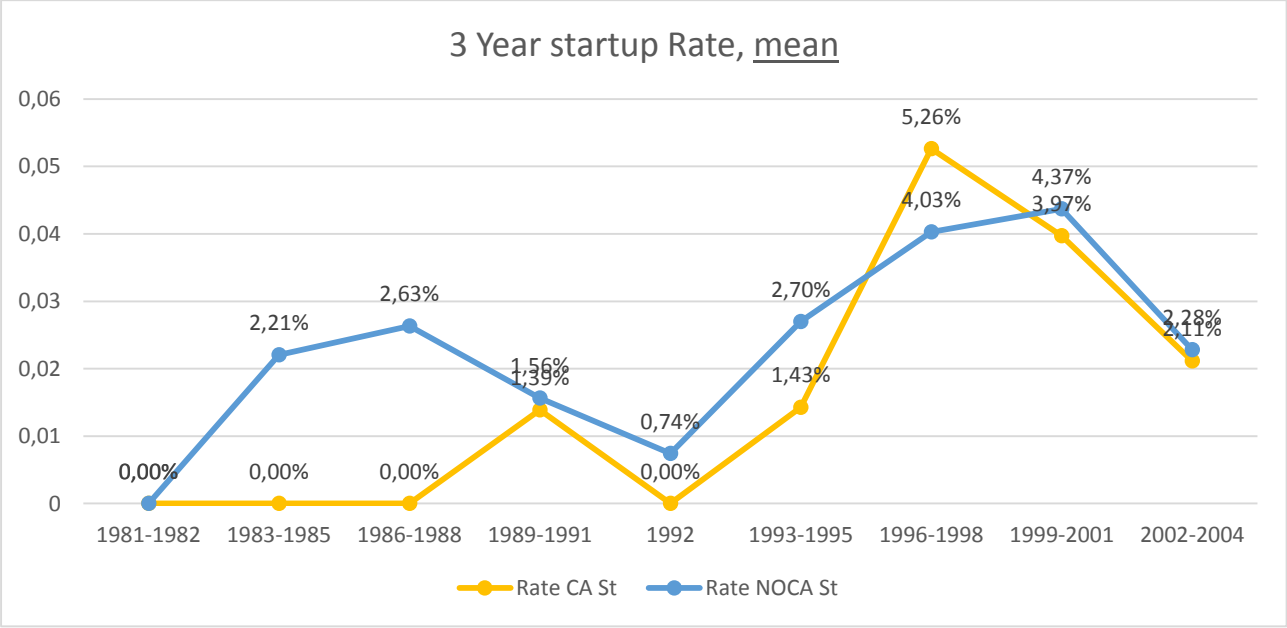

Chart 1_E: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), startups being three years old or less

Chart 1_G

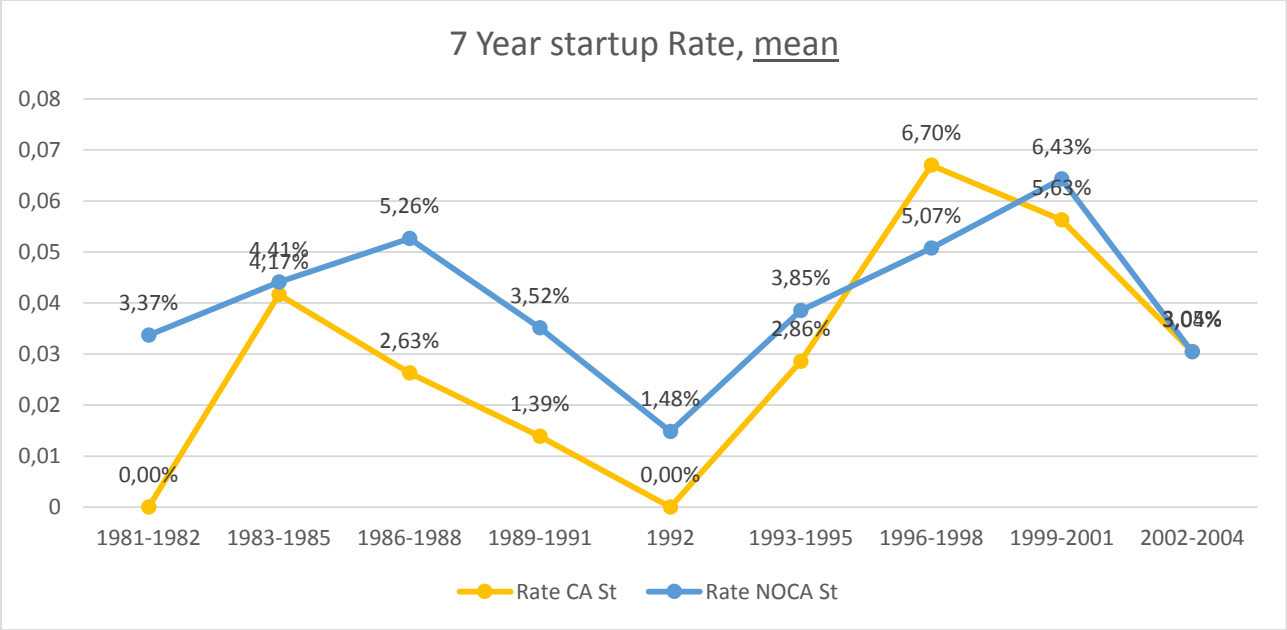

Chart 1_G: mobility rates of individuals moving to startups in California (yellow line) and outside California (blue line), startups being seven years old or less

8.4. Tests

Figure 4_A

```
. prtest mobst3onNonm if post==1, by (calif)

Two-sample test of proportions                    0: Number of obs =     1062
                                                  1: Number of obs =      712
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |   .0376648   .0058421                      .0262145    .0491151
           1 |   .0589888   .0088296                       .041683    .0762945
-------------+----------------------------------------------------------------
        diff |   -.021324   .0105874                     -.0420748   -.0005731
             |  under Ho:   .0101702    -2.10   0.036
------------------------------------------------------------------------------
        diff = prop(0) - prop(1)                                      z =  -2.0967
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0180         Pr(|Z| < |z|) = 0.0360          Pr(Z > z) = 0.9820
```

Figure 4_A: pr test between individuals moving to startups (three-year definition) after 1992 outside (0) and in California (1)

Figure 4_B

```
. prtest mobst7onNonm if post==1, by (calif)

Two-sample test of proportions                    0: Number of obs =     1062
                                                  1: Number of obs =      712
```

Variable	Mean	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	.0508475	.0067412			.0376349	.0640601
1	.0884831	.0106432			.0676228	.1093435
diff	-.0376357	.0125985			-.0623283	-.0129431
	under Ho:	.012022	-3.13	0.002		

```
        diff = prop(0) - prop(1)                                      z =  -3.1306
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 0.0009         Pr(|Z| < |z|) = 0.0017          Pr(Z > z) = 0.9991
```

Figure 4_B: pr test between individuals moving to startups (seven-year definition) after 1992 outside (0) and in California (1)

Figure 10_B

```
. ttest back5_sc_p if realmoving==1, by ( mob_startup5)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	278	.5603517	.1080774	1.80201	.3475944	.773109
1	105	.1063492	.0488015	.5000661	.0095741	.2031243
combined	383	.4358863	.0802066	1.569674	.2781845	.593588
diff		.4540025	.178528		.1029791	.8050259

```
    diff = mean(0) - mean(1)                                      t =   2.5430
Ho: diff = 0                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9943         Pr(|T| > |t|) = 0.0114          Pr(T > t) = 0.0057
```

Figure 10_B: t-test concerning five-year backward citations per patent for individuals moving to incumbents (0) or to startups (1)

Figure 10_C

```
. ttest back5_p if realmoving==1, by ( mob_startup5)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	278	5.493605	.6528287	10.88483	4.208469	6.778741
1	105	8.495669	1.198044	12.27629	6.119903	10.87143
combined	383	6.316625	.5797756	11.34643	5.176674	7.456576
diff		-3.002064	1.29228		-5.542958	-.4611697

```
    diff = mean(0) - mean(1)                                      t =  -2.3231
Ho: diff = 0                                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0104         Pr(|T| > |t|) = 0.0207          Pr(T > t) = 0.9896
```

Figure 10_C: t-test concerning backward citations to recent patents (five years old or more recent) per patent for inventors moving to incumbents (0) or startups (1)

Figure 13

```
. ttest patent if calif==0, by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	1055	1.838863	.0658285	2.138161	1.709693	1.968032
1	4176	2.466236	.057828	3.736957	2.352862	2.579609
combined	5231	2.339706	.0481597	3.483184	2.245292	2.434119
diff		-.6273731	.1197199		-.8620741	-.392672

```
    diff = mean(0) - mean(1)                                      t =  -5.2403
Ho: diff = 0                                     degrees of freedom =     5229

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Figure 13: t-test concerning patents per employee published outside California pre (0) and post (1) 1992

Figure 14

```
. ttest patent if calif==1, by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	207	1.449275	.0599426	.8624232	1.331096	1.567455
1	2488	2.23754	.0481282	2.400628	2.143165	2.331916
combined	2695	2.176994	.0448504	2.328336	2.08905	2.264939
diff		-.7882648	.1677732		-1.117242	-.4592876

```
    diff = mean(0) - mean(1)                                      t =  -4.6984
Ho: diff = 0                                     degrees of freedom =     2693

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Figure 14: t-test concerning patents per employee in California pre (0) and post (1) 1992

Figure 15

```
. ttest patent if realmoving==1 & calif==0, by ( mob_startup7)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	152	1.526316	.077511	.9556203	1.37317	1.679462
1	62	1.854839	.167172	1.316313	1.520558	2.18912
combined	214	1.621495	.0738121	1.079778	1.476	1.766991
diff		-.3285229	.1615286		-.6469309	-.0101149

```
    diff = mean(0) - mean(1)                                      t =  -2.0338
Ho: diff = 0                                     degrees of freedom =      212

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0216         Pr(|T| > |t|) = 0.0432          Pr(T > t) = 0.9784
```

Figure 15. t-test concerning patents per employee outside California for individuals moving to incumbent (0) and startups (1)

Figure 16

```
. ttest forw_p if realmoving==1 & mob_startup3==0 , by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	29	18.68678	2.780358	14.97269	12.99148	24.38209
1	273	8.560236	1.028572	16.9948	6.535262	10.58521
combined	302	9.532653	.9812508	17.05232	7.601672	11.46363
diff		10.12655	3.284393		3.663179	16.58991

```
    diff = mean(0) - mean(1)                                      t =   3.0832
Ho: diff = 0                     degrees of freedom =      300

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9989         Pr(|T| > |t|) = 0.0022          Pr(T > t) = 0.0011
```

Figure 16: t-test concerning forward citations per patent for individuals moving to incumbent pre (0) and post (1) 1992

Figure 17

```
. ttest back5_sc_p if realmoving==1, by ( mob_startup3)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	302	.535688	.1006903	1.749811	.3375419	.7338341
1	81	.063786	.0287735	.2589615	.0065249	.1210471
combined	383	.4358863	.0802066	1.569674	.2781845	.593588
diff		.471902	.1951757		.0881457	.8556583

```
    diff = mean(0) - mean(1)                                      t =   2.4178
Ho: diff = 0                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9920         Pr(|T| > |t|) = 0.0161          Pr(T > t) = 0.0080
```

Figure 17: t-test concerning 5 year-backward self-citations per patent for individuals moving to incumbent (0) or to 3-year startups (1)

Figure 18

```
. ttest back5_sc_p if realmoving==1, by ( mob_startup7)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	262	.5907549	.1143617	1.851105	.365566	.8159438
1	121	.100551	.0430989	.4740875	.0152182	.1858837
combined	383	.4358863	.0802066	1.569674	.2781845	.593588
diff		.4902039	.1709215		.1541364	.8262715

```
    diff = mean(0) - mean(1)                                      t =   2.8680
Ho: diff = 0                                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9978         Pr(|T| > |t|) = 0.0044          Pr(T > t) = 0.0022
```

Figure 18: t-test concerning 5-year backward self-citations per patent for individuals moving to incumbents (0) or to 7-year startups (1)

Figure 19

```
. ttest back_sc_p if realmoving==1, by ( mob_startup3)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	302	1.067936	.1584173	2.753	.7561903	1.379682
1	81	.2111405	.054147	.4873228	.1033846	.3188964
combined	383	.8867338	.1266604	2.478793	.637695	1.135773
diff		.8567955	.3074548		.2522749	1.461316

```
    diff = mean(0) - mean(1)                                      t =   2.7867
Ho: diff = 0                                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9972         Pr(|T| > |t|) = 0.0056          Pr(T > t) = 0.0028
```

Figure 19: t-test concerning backward self-citations per patent for individuals moving to incumbents (0) or to 3-year startups (1)

Figure 20

```
. ttest back_sc_p if realmoving==1, by ( mob_startup7)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	262	1.193448	.1801055	2.915263	.838803	1.548093
1	121	.2226092	.0592508	.6517583	.1052968	.3399216
combined	383	.8867338	.1266604	2.478793	.637695	1.135773
diff		.9708386	.268241		.4434205	1.498257

```
    diff = mean(0) - mean(1)                                      t =   3.6193
Ho: diff = 0                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9998         Pr(|T| > |t|) = 0.0003          Pr(T > t) = 0.0002
```

Figure 20: t-test concerning backward self-citations per patent for individuals moving to incumbents (0) or to 7-year startups (1)

Figure 21

```
. ttest back5_p if realmoving==1, by ( mob_startup3)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	302	5.608352	.6473455	11.24967	4.334456	6.882248
1	81	8.957349	1.265026	11.38523	6.439867	11.47483
combined	383	6.316625	.5797756	11.34643	5.176674	7.456576
diff		-3.348997	1.411223		-6.123758	-.5742358

```
    diff = mean(0) - mean(1)                                      t =  -2.3731
Ho: diff = 0                     degrees of freedom =      381

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0091         Pr(|T| > |t|) = 0.0181          Pr(T > t) = 0.9909
```

Figure 21: t-test concerning 5-year backwards citations per patent for individuals moving to incumbents (0) or to 3-year startups (1)

Figure 22

```
. ttest back5_p if realmoving==1 & mob_startup5==1 , by (post)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	8	0	0	0	0	0
1	97	9.196343	1.271234	12.52021	6.672962	11.71972
combined	105	8.495669	1.198044	12.27629	6.119903	10.87143
diff		-9.196343	4.446234		-18.0144	-.378286

```
    diff = mean(0) - mean(1)                                      t =  -2.0683
Ho: diff = 0                                     degrees of freedom =      103

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0206         Pr(|T| > |t|) = 0.0411          Pr(T > t) = 0.9794
```

Figure 22: t-test concerning 5-year backward citations per patent for individuals moving to 5-year startups pre (0) and post (1) 1992