The trifurcation of the labor markets in the networked, knowledge-driven, global economy¹

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Abstract

This conceptual, interdisciplinary paper will start with an introduction to the new, networked, knowledge-driven, global economy. The objective of this paper, using a narrative review of the economic, business and management literature of labor markets and human capital, will be to negate the notion that we have, at present, one labor market for human capital, and will conjecture that we currently have (or are about to have) three autonomous markets for labor that are driven by different market dynamics and mechanisms. The three markets are identified as: routine labor, skilled labor, and talent. Each one of the markets will then be discussed, including future trends, issues and remedies. This trifurcation of the labor markets is mostly the combined result of phase transition resulting from three major impetuses. The first is the effect(s) that technological revolutions have on the supply and demand of multidimensional skills of human capital. Second is the ‘winner take all’ market structure enabled by the ‘industrial’ economy’s framed legislation and social norms. The third impetus is the context (for the technological revolutions and the nature of the markets) of a networked global economy that is driven by knowledge developing at an accelerated pace. The narrative multidisciplinary literature review used was a modified version of the integrative literature review. The review confirmed that the three labor markets’ dynamics are to a considerable degree dissimilar and that legislating, conducting monetary and fiscal policies that treat them as one labor market could (and probably already does) cause more harm than good, resulting in destabilizing the labor markets (as indicated by the growing unemployment rate of the young generation worldwide) and by extension, the social fabric of the new economy (as indicated by the growing economic and educational inequality worldwide). The paper concludes with a framework of the three labor markets, followed by a summary, including the need for a new legal and social paradigm regarding labor and the need for a new formal model for value creation. Finally, the limitations of the study as well as potential research gaps are identified.

Keywords: new knowledge-driven economy, labor markets, trifurcation, routine labor, skilled labor, talent

¹ This is a modified and significantly enhanced version of a chapter by Russ, 2014a.
Introduction - The new knowledge-driven economy

The new networked knowledge-driven economy and the relentless technology-driven economic and social developments are creating a society and an economy unlike anything the human race has ever faced before (Arora & Gambardella, 1994; Stevens, 1996; Leydesdorff, 2006; Carayannis, 2010), one that Floridi (2014) defined as infosphere. For me, Ray Kurzweil (2005) popularized it best with the bestselling title of his book, “Singularity is near.” At the end of the twentieth century more than eighty percent of the economy of developed countries, as measured by their gross domestic product (GDP) are intangibles (Nakamura, 2001), and become the largest systematic source of economic growth (Corrado & Hulten, 2010, p. 102). Moreover, recent research submits that financial capital and labor combined account for only 14% of economic growth\(^2\). The supplementary 86% is explained by energy (Ayres & Ayres, 2010, p. 14) and knowledge-human capital, which currently are not reported and/or depicted directly by the financial markets.

Experts suggest (e.g., Lev, 2001; Schmidhuber, 2007; Bates, Kahle, & Stulz, 2009) the mid-1980s as the time when knowledge, as a production factor, product and outcome, became a prominent factor in the new global economy. Some examples to illustrate the unique aspects of the new knowledge-driven economy are: the precipitously shrinking half-life of knowledge (Siemens, 2005) which is currently, in management, engineering and medicine, approximately two years; the apparent detachment between productivity gains and labor wages (Fleck, Glaser, & Sprague, 2011; Sachdev, 2007) whereas companies are hiring more part-time employees, paying lower wages, and reacting more aggressively to economic downturns (Hanka, 1998); the 5% decline in global share of labor of income since 1975 (Karabarbounis & Neiman, 2014); and, the explanatory power of educational attainment for earnings increase noticeably corresponding with returns to skills (Acemoglu & Autor, 2011). Those trends has been enhanced recently significantly by the technological impetus resulting from a growing adoption of social networks, deep learning artificial intelligence and robotics (e.g., Russ, 2016). Let’s add now to the above mentioned a brief discussion of intangibles and knowledge, a few major characteristics of the present economy, and the social sphere.

The growing national debt, minimal real return (zero, or even negative) on financial capital, the growing pace and severity of economic crises (recessions), and the slower rate of economic and labor (wages and employment) recovery are few of the major facets of the post-2009 crisis economy. Also, the ‘hoarding’ of considerable amounts of cash by successful companies (e.g., Pinkowitz, Stulz, & Williamson, 2014), the declining rates of new start-ups (e.g., Kane, 2012), the ‘winner take all’ market and technology strategies (e.g., Noe & Parker, 2005), and the complex, counter-intuitive and high-risk business and technology strategies (e.g., Del Giudice & Della Peruta, 2016; Vrontis, Thrassou, Santoro, & Papa, 2016) are some of the facets of the current business environment, resulting in growing concentrations of capital and power, and increasing the probability of unexpected systematic failure (e.g., Taleb, 2014; Kelly, 2015)\(^3\). And finally, growing economic, political and educational inequalities are becoming a global social phenomena (e.g., Stiglitz, 2012).


\(^3\) See also Goldman Sachs concerns at http://www.bloomberg.com/news/articles/2016-02-03/goldman-sachs-says-it-may-be-forced-to-fundamentally-question-how-capitalism-is-working
Such a distinctive economy may suggest that the current market and legal structure are inadequate (at best) for facilitating the majority of the population and institutions to deal with such an extraordinary change (Rainie & Wellman, 2014; Rickards, 2014; Rifkin, 2014), questioning some basic assumptions we hold to be true for a healthy, free, democratic and flourishing capitalistic society. The more recent data about the extremely high and still growing level of economic and educational inequality, the high level of unemployment and underemployment, especially among the younger demographics (e.g., Thompson, 2015) and others, requires an urgently needed solution. At the same time, companies are looking for talent and skilled employees worldwide with limited success.

To this end, the following question will be discussed in this conceptual paper: in the context of the new networked, knowledge-driven, global economy, do we still have one labor market or are the recent waves of technological revolutions causing a phase transition of the labor market into three (since trifurcation) distinctive labor markets? To facilitate such discussion, in the rest of this article I intend to analyze the labor markets and I would suggest that we need to accept the reality of three distinctive labor markets, each responding to very different forces and dynamics and requiring different legal frameworks and economic policies.

**Methodology**

This narrative multidisciplinary literature review draws on multiple academic literatures. Among them, the labor’s economic literature, technology management and business innovation literatures, human capital and knowledge management literatures, and psychology and organizational behavior literatures. The main focus has been on articles and books published during the last five years, but earlier literature was used as well, as needed. The literature of labor and labor markets in the new economy is voluminous (see recent examples at: Betcherman, 2012, 2015; Pavlin, 2014) and systematic review of such literature is beyond the scope of this paper, as such this paper is selective in that it expositions only some of the most significant research contributions and highlights the most important aspects as relevant to the changing nature of the labor markets in the new, networked, knowledge-driven economy.

Three databases were utilized, continuously using a snowballing process among references (backward and forward) for over 3 years. We used: ABI; EBSCO-Business source premier, and Google Scholar. All three databases were employed since, for many aspects of the research, we found them to be complementary. Initial screening was conducted using key words searches of titles and abstracts, followed by a collection of full texts, but this was of limited usefulness. For example, a search of “bifurcation” and “labor markets” in abstracts of ABI and EBSCO resulted in 11 articles (each) with only 8 relevant to the scope of this paper. The following key words were used (in different combinations): labor markets, ontology, new economy, talent, unemployment, underemployment,

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4 See also Thompson, 2015.
5 See also Rogerson, Shimer, & Wright, 2005; McGuinness, 2006; Neumark & Wascher, 2007; Okkerse, 2008; Crino, 2009.
6 A similar approach can be seen at Greenaway & Nelson, 2001; Menger, 2006; Fields, 2007; Neumark & Wascher, 2007.
7 Open time frame; no limits for years.
bifurcation, trifurcation, narrative review, human capital, monopolistic competition, monopsony competition, winner-take-all, creativity, idea, information, knowledge, and entropy. In total, the number of references used (see below) is 226.

Heidegger’s (1954) ontology of technology (and knowledge) was used since it allowed us to cover the broad scope of the multidisciplinary nature of the subject. The five components of the framework: operational, collaborative, organizational, instrumental and holistic were adopted and modified to outline our ‘Trifurcation framework’ (see Figure 3 and Table 2 below). The narrative multidisciplinary literature review used was a modified version of an integrative literature review (Torraco, 2005). This methodology allows for initial conceptualization resulting in a new model and/or framework, offering a new perspective on a multidisciplinary topic (pp. 357-8). See summary of the research process in Figure 1, below.

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**Figure 1.** Summary of the research process: A narrative interdisciplinary integrative literature review process

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8 Thanks to Laura Albareda for bringing this to our attention.
9 See an example in Iñigo & Albareda, 2016.
10 See Torraco, 2005 (p. 358) for examples in Human Resource studies.
11 cf. with Fig. 1 in Iñigo & Albareda, 2016 (p. 3).
One or three labor markets?

The traditional academic economic literature refers to labor as a single asset, where there is differentiation by skill (see T₁ in Figure 2 below), education, etc., (Acemoglu & Autor, 2011, 2012; Philippon & Reshef, 2012; Katz & Margo, 2013), but it is subject to one set of rules, forces, legislation, dynamics, etc., operating in the labor market (e.g., Goldin & Katz, 2009) where human capital is augmenting the effective units of labor (Acemoglu & Autor, 2012, p. 427). In a similar vein, the traditional social science literature (e.g. Brown, Hesketh, & Williams, 2003) is searching for one theory that will explain the labor’s supply and demand dynamics in the knowledge-driven economy. Here, my conjecture goes beyond the distinction used by the present economic literature¹² and partitions that single market into three distinctive labor markets, since trifurcation¹³, which I would call: routine labor, skilled labor, and talent (Russ, 2014a). Each one of the three is different (e.g., different production functions consistently equate the value creation), and even though today (see T₂ in Figure 2 below, along the a₁, b₁ and c₁ trajectory) there is still some fuzziness at the margins and blending at the edges, the fast technology-accelerated development and globalization is reducing such amalgamation and making the boundaries between the three sharper and the distinctions significant. The transition from one labor market to three distinctive markets (see T₃ in Figure 2 below, along the a₂, b₂ and c₂ trajectory) could be seen as gradual, but at this point in time, my contention is that we have enough evidence to treat the three differently and separately and that preserving their treatment as one market does more harm than good to public discussion, policy making and academic research. This may require some additional explanation.

First, I have to consent that such trifurcation (into routine labor [A], skilled labor [B], and talent [C]) and its implications might be controversial for many readers since it might have emotional, political, and societal connotations and implications (e.g., Reich, 2013). But such an amendment of the labor market is supported by present developments of technological frontiers (Kümmel, 2011; Frey, 2015), direct and indirect (e.g. globalization; Autor, Dorn, & Hanson, 2016) impacts of technology (e.g., Karabarbounis & Neiman, 2014), and by changes in social norms and legislation. For example, the social and economic consequences of the present discussion of raising the minimum wage in the US (e.g., Laliberte, 2012; Kotler, 2015) to a living wage can only be understood when one realizes that market forces (supply and demand of unskilled labor) will push the cost of labor as close to zero as possible (see A in time T₃ in Figure 2 below) because of an almost unlimited supply and very limited, and I would add temporary, demand. The situation of the oversupply of labor is so damaging that more people are dropping out of the labor force today than in the last thirty years, and, more than ever, employees are taking jobs that they are overqualified for, what the economists call underemployment (e.g., Howell, 2010; BLS, 2013), with long-term damaging financial consequences (e.g., Guvenen, Kuruscu, Tanaka, & Wiczer, 2015). All this is happening while at

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¹² Including the time dependent bifurcation (e.g., Barnett & Chen, 2015; Bianca, Ferrara, & Guerrini, 2013); and a two-dimensional bifurcation of a labor model which includes human capital and production of new ideas (Barnett & Ghosh, 2013).

the same time companies complain that even in the worst economy they have skilled jobs that they cannot fill and they have a significant demand for talent, which also they cannot fill (e.g., Quintini, 2011; Accenture, Burning Glass, & Harvard Business School, 2014); (see more below).

Nonlinear behavior of labor markets, and bifurcation specifically, was studied earlier in a specific context (e.g., immigration, or income inequity) by Chiarella, Flaschel, Groh and Semmler (2000); Neugart (2000); Saint-Paul (2001); Tisdell and Svizzero (2003); Gries and Jungblut (2007); and Holden and Spinu (2014), among others. Studies in industrial sociology use the dual economy and dual labor market theories to examine human resources practices (e.g., Parcel & Sickmeier, 1988) and bifurcation of work due to ‘deskilling’ (e.g., Baldoz, Koeber, & Kraft, 2001). To the best of our knowledge, this paper is the first to propose a trifurcation of the labor market as a global (not local or context specific) phenomena. As such, there are two qualitative changes in the form of equilibrium, and two points of bifurcation of the system, (cf. Venables, 1996, p. 352) which this paper is suggesting are (at minimum) a function of time.

The major driver behind this discontinuous labor market disruption, causing the phase transition is the breathtaking pace of the development of the infosphere (Floridi, 2014): the combination of Artificial Intelligence (AI), Robotics, Internet of Things (IoT) and other telecommunication, computer based technologies, what Bresnahan and Trajtenberg (1995) called “general purpose technologies”. The combination of technologies, as suggested by Floridi (2014), is an oversimplification of the revolutionary nature of the technological disruptions of economic and social markets. In reality, in the last 40 years, the economy, labor markets and firms are going through a number of waves of such disruptions (see a discussion of how labor markets are responding to a single disruption in the last 30 years in Hornstein, Krusell, & Violante, 2005). Those technologies are expected to eliminate (by replacing) tens of millions of low-skilled jobs and medium-skilled, highly routine jobs (e.g., Goos, Manning, & Salomons, 2014; Schwab & Samans, 2016) in near future, while creating a significantly smaller number (complementary and new) of highly-skilled jobs (see B in time T3 in Figure 2 below)14. The effect of this technological pressure on the skill15 to value-added relationship (see Figure 2) can be seen when moving (along the a1, b1 and c1 trajectory and then along the a2, b2 and c2 trajectory) from T1 (past) to T3 (future): where more and more jobs of “routine labor” (low skills [A]) either disappear or have a below-living-wage economic value (a); the “skilled labor” (medium-high skills [B]) market is shrinking (together with the middle class), while being more competitive at the low end due to increasing supply and future options of being replaced by technology, and the high-end because of the higher demand for skilled labor (job polarization) and the continuous need for learning and adapting to faster and faster changes (b); and the growth of the “talent” (highly-skilled and creative [C]) market which is creating an increased value (c); (Russ, 2014a).

14 See also the literature on skill biased technological change (e.g., Bound & Johnson, 1992; Fowler & Fowler, 2012; Buera, Kaboski, & Rogerson, 2015) and the pervasiveness of job polarization (Snower & Goerlich, 2013; Goos, Manning, & Salomons, 2014).

15 Please note the difference between skills (used here in Figure 2) and human capital (traditionally referred as education) not used here. This distinction is important as in some industries and/or economic segments the two are highly related, while in others (unique markets, e.g. arts) they are not (see example in Rengers, 2002; chapter two).
The traditional economic literature (in the context of technological change) refers to two sectors of labor: skilled and unskilled (Katz & Murphy, 1992), and to a substitution between the two sectors (assuming that there is a substitution between the two). This paper is advocating the conjecture that there is no substitution for the critical, relevant skills between the three markets. For the low end of skills, the jobs, tasks and the skills needed for them are replaced (or have a short term potential to be replaced) by technology, when the skills needed to operate the technology are not attainable by the low skill labor (gap in individual absorptive capacity that cannot be closed\(^{16}\); see a similar assumption in Lindbeck & Snower, 1996); and/or are orthogonal different (see example in Fowler & Fowler, 2012; p. 70 - who assume that the unskilled do not have access to human or physical capital; or see Snower & Goerlich, 2013, for the competency of high level of multitasking). As such, this paper is suggesting that the classic assumptions that the ‘one labor market’ literature has regarding the continual distribution of skills in the labor market is not appropriate. At the low end of skills, even the model of a finite number of skills (e.g. Cahuc & Laroque, 2014) is optimistic, since when the capacity or relearning of new skills\(^{17}\) is eroded, and due to the accelerating shrinkage of half-life of knowledge, the number of skills that are relevant for value creation are actually reduced.

For the high end of skills, there is no substitution between (what is defined here as) talent and skills. In the multidimensional space of skills, talent operates in dimensions that are orthogonal\(^{18}\) to those of skills (as defined here), and because of the ‘winner takes all’ nature of the market for talent, the infosphere disruption is talent biased (cf. with observation 15 in Hornstein, Krusell, & Violante, 2005). Also, countering the prediction of the theory of directed technical change, that a growth in the relative supply of a factor of production (talent), will induce technological change that is biased in favor of this factor (e.g. Hornstein, Krusell, & Violante, 2005), in a winner-take-all market, this may not happen, since the change is technology-push driven, and a competing technology may take over, which requires a different set of skills (through discontinuous change resulting from disruptive innovation, see Christensen, 1997; Utterback & Acee, 2005) at a very fast pace. Add to that\(^{19}\) the inability of the price to convey the scarcity of talent, due to the high uncertainty of value\(^{20}\) (in some cases the value is unknowable.

\(^{16}\) Consider as an illustration a billion dollar machine in a paper mill operated by a few machine operators with a master’s degree in engineering and computer sciences and the possibility of them being replaced by high school graduates. See also the findings in Fowler & Fowler, 2012 and Guvenen, Kuruscu, Tanaka, & Wiczer, 2015.

\(^{17}\) See Guvenen, Kuruscu, Tanaka, & Wiczer, 2015 for a model of multidimensional learning about abilities to acquire skills.

\(^{18}\) See example in Regev & Zoabi, 2014 proposing a model of entrepreneurial talent enabling the entrepreneur to search for an appropriate technology and to match that technology within the most profitable segment, despite being faced with information friction resulting from the inability to know how well the talent matches the needs of the technology and/or the segments (assuming investments in search are equal between individuals). This paper is suggesting that above and beyond such differences between individuals as listed above (and between countries as their model suggests), the talent’s costs of investments of the search are different between individuals, since the more talented are more effective, efficient and/or lucky by being located in (or close by) a winner-take-all market, which is shortening their time for search, and also increasing the probability for a successful match due to smaller information asymmetry (see partial support in Jung & Subramanian, 2013). All this is adding to and accelerating the non-linear response proposed in their model (small differences are amplified by talent utilization).

\(^{19}\) How the talent market is different.

\(^{20}\) Over 20% of Fortune 500 CEOs are dismissed annually (in recent years) while the average tenure went up in 2013 to 9.7 years (see http://blogs.wsj.com/atwork/2014/04/09/study-ceo-tenure-on-the-rise/ ).
at the time of the hiring/transaction decision) and the high asymmetry of information. For example, in the case of top CEOs, the price in many cases is actually the buying ‘real’ option price of the value the talent is expected to create in the future (e.g., Jacobs, 2007; Jung & Subramanian, 2013).

Let’s now discuss, in more depth, each of the three labor markets and their descriptions, the current situation, the future under the current economic and legal system, and the specific solution and implications I’m recommending framed by the Homo Sustainabiliticus (see later) paradigm (Russ, 2014b; Russ, 2016).

A. Routine Labor market

I proposed (Russ, 2014a) to view “routine labor” as a human assets commodity with limited differentiation in skill, facing a monopsonistic competition where a limited number of buyers (firms, governments, not-for-profits, small and medium-sized enterprises (SMEs), etc.) prescribe the employment terms (within the legal setting) to a powerless
mass of little-differentiated employees\textsuperscript{21} that have limited employment options\textsuperscript{22} and, for any practical matter, have very limited social and geographical\textsuperscript{23} mobility. The value\textsuperscript{24} generated by routine labor is minimal (see also Kümmel, 2011), and the salaries and wages are typically prescribed by legislation, labor laws, political pressure and social norms regarding employment, unemployment, minimal wage, etc., (e.g., Kotler 2015), ensuing from a dysfunctional labor market (see Figure 2, A at time $T_2$). Therefore, routine labor wages and salaries will be mostly dictated by minimum wage legislation or alternative unemployment benefits and subject to idiosyncratic dynamics\textsuperscript{25}, being driven more by social and political than economic issues\textsuperscript{26}. On the other hand, since the legal structure and economic and business forces allow for multiple arrangements to match the supply and demand of routine labor in this inefficient market\textsuperscript{27}, this market should not be seen as uncomplicated. One illustration of such uniqueness is demonstrated in studies regarding the base-of-the-pyramid (BOP) labor markets and their mechanisms, such as altering the classic principal–agent relationship by forming the agent as a principal (Kistruck, Sutter, Lount, & Smith, 2013, p. 663). Another example of this complexity is what Autor and Dorn (2013) categorize as the service occupation (versus the service sector). In their study, they identified an increase in numbers of both employees and wages\textsuperscript{28}, for example, by providing personalized services to high-income individuals; trends that are considerably different from those for the middle- and higher-skill percentiles\textsuperscript{29}. Moreover, for the US – but not only there, it became painfully clear that prisons\textsuperscript{30} and some parts of the military\textsuperscript{31} and other public sectors are part of the public market solution for employment in this low-end (even negative) value-creation sector.

If the proposition stated above can be confirmed, this should have enormous implications. One implication is that the higher education of this sector (routine labor) cannot be seen from a narrow economic perspective as a human

\textsuperscript{21} e.g., Bidwell, 2013, including what Standing (2011) called “precariat”; see also a review in Munck, 2013; and direct evidence in Webber, 2015.

\textsuperscript{22} Mostly due to minimal individual level absorptive capacity (e.g., ter Wal, Criscuolo, & Salter, 2011) and inability to learn new skills (e.g., Nemhard, & Uzumeri, 2000) at times when the half-life of knowledge is short and shrinking (e.g., Russ, 2016).

\textsuperscript{23} A plausible explanation could be the relatively high cost of housing and financing which make mobility impractical in many cases in the US, while in other countries, geographical mobility is not a commonly accepted practice and norm (see for example Florida, 2014; and cf. with Molloy, Smith, Trezzi & Wozniak, 2016).

\textsuperscript{24} Since the majority of the jobs discussed here are in the service sector (see also Autor & Dorn, 2013), this discussion of “value” goes above and beyond the credence attribute aspects of the value of a service as a product (Yadev & Berry, 1996; Walker, Johnson, & Leonard, 2006) and the public good aspect (Stiglitz, 1999), which were always inherent in the discussion of service valuation and have become even more entangled with the attributes and characteristics of knowledge as a product and/or production factor (Grant, 1996; Gherardi, 2000).


\textsuperscript{26} See also review by Neumark &Wascher, 2007.

\textsuperscript{27} See interesting discussions in Cappelli & Keller, 2013; Leoni & Gritti, 2013.

\textsuperscript{28} A similar pattern was found in the Swedish economy for the 1985-95 timeframe (Savvidou, 2006) for embodied technical change.

\textsuperscript{29} The study covers the time frame between 1980 and 2005.


\textsuperscript{31} See for example Mittelstadt, 2015.
For example, research conducted in Italy and grounded in 2004 data, discovered about 14% of the employees to be overeducated (Cainarca & Sgobbi, 2012). A similar study carried out in China, based on 2003 data, described about 20% of higher education graduates to be overeducated (Li, Morgan, & Ding, 2008). More recent data suggests that this statistic is worsening, especially for the younger generation\(^{33}\). Sattinger and Hartog (2013) quantified the drawbacks for over-education in wage corollaries to be between 1.7 and 7.7 percent (see also Guvenen, Kuruscu, Tanaka, & Wiczer, 2015). Consequently, seen from a narrow economic perspective, such an investment in higher education should be seen as a human assets debt, since economic benefits from the unemployment or underemployment of those individuals are minimal at best, if not negative (Bivens, Fieldhouse, & Shierholz, 2013; Leoni & Gritti, 2013). Moreover, this may explain the high level of default on educational loans in the US, especially at for-profit colleges. From the broader social perspective, this may suggest that education (like health care) should be alternatively considered as a right (Yamin, 1996; Oakes, Rogers, Blasi, & Lipton, 2008) and not as a product, since if delineated as a product, a significant and growing portion of the population will not be able to afford it, and as such, it should be more of a social and political issue and not an economic one.

Another implication this postulation has is in regard to what some call the ‘poverty trap’: presently seen as a temporary trap (e.g., Stapleton, O'Day, Livermore, & Imparato, 2006) that the willing and hardworking can escape only if they work hard enough, or acquire new skills (Guvenen, Kuruscu, Tanaka, & Wiczer, 2015). Recent research on the trap and the indicators of lack of social mobility, as well as from the ‘labor’ market perspective, might suggest that this is, to a large degree, a permanent social and educational problem, not only an economic\(^{34}\) issue (similar to the Bottom of the Pyramid; Prahalad, 2005), and that the old way of resolving the issue will not do, especially since this segment of the labor market and population is growing both in absolute number and as a percentage of the labor force.

Additional complications for this postulation are race and gender issues. This segment of the labor market has a higher representation of males (worldwide\(^{35}\)) and African Americans (in the US\(^{36}\)), resulting in social, political and other major concerns (which are beyond the scope of this paper)\(^{37}\).

\(^{32}\) When high school or vocational education might be sufficient for the tasks at hand (Autor & Dorn, 2013). See also Basu, 2015, where in many countries education, at different levels, has none, or negative impact on economic growth (p. 17).

\(^{33}\) For example, higher than 40% for young college graduates in the US since 2009, (see http://www.theatlantic.com/business/archive/2015/05/the-new-normal-for-young-workers/393560/).

\(^{34}\) Lack of access to capital, e.g., Ferguson, 2009, p. 15.


\(^{36}\) See example at Schulz, Gravlee, Williams, Israel, Mentz, & Rowe, 2006.

\(^{37}\) See Frase, 2015 as referenced in Thompson, 2015; also at http://www.versobooks.com/books/1847-four-futures
To summarize, here are the characteristics of the routine labor market:

**Description**

Minimal skills are required for the jobs in this market, mostly in services. Employees have either minimal education (high school or less) or undergraduate degrees, have minimal training, and are employed in low paying (below living wage) jobs.

**Current situation**

- High number of unemployed (e.g., Bell & Blanchflower, 2011) and underemployed\(^{38}\).
- Very limited social and geographic mobility.
- High and growing personal debt due to cost of education, growing default rate (e.g., Athreya, Sánchez, Tam, & Young, 2013).
- Employment in these sectors is growing slowly, with stagnate salaries, due to high concentration of (monopsonic) labor demand, large and growing supply of labor, ongoing pressure of technology\(^ {39}\), and tough international price competition. Current salaries are also driven by minimum wage legislation and unemployment safety-net legislation.

**Future under current economic and legal system**

- Work/labor will not be available to all wanting jobs.
- A second wave of robotics and AI will replace even growing sectors in this market when the price point and performance reach the right levels, resulting from the learning curve of such technology implementation in the skilled labor market (see below)\(^ {40}\).
- Minimal new opportunities will be created in the future.
- Monopolistic-monopsonic, demand-side-driven, competition for cost (wage) of labor.
- Growing gray (barter) labor gig-economy (e.g. Milkman, & Ott, 2014) markets.

**Solution recommended**

- Change in social norm regarding labor, resulting in legislation of minimum living wage\(^ {41}\) and/or ‘basic income’\(^ {42}\).

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\(^{38}\) About 48% of employed US college graduates are in jobs that the Bureau of Labor Statistics (BLS) suggests require less than a four-year college education; see Vedder, Denhart, & Robe, 2013.


\(^{40}\) Vardi estimated 50% of all the global workforce by 2045 (Vardi as cited in Zillman, 2016).

\(^{41}\) See also Cahuc & Laroque, 2014; Colin & Palier, 2015; Thompson, 2015.

\(^{42}\) See an interesting recent discussion in Freedman, 2016.
• Creation of not-for profit, social services opportunities to employ-similar to Roosevelt’s Civilian Conservation Corps (e.g., Brauer, 1982) or the Danish and Dutch experimentations (e.g., Green-Pedersen, Kersbergen & Hemerijck, 2001).
• Defining higher education as a right (not a product-service) subject to market forces-similar to the German experience

B. Skilled Labor market

The immense and continuously contracting middle arena of labor markets (see Figure 2, B at time $T_2$) is presently dominated by skilled employees, who have commonly codified skills (which is the cause for future potential job elimination; e.g., Chipulu, Neoh, Ojiako, & Williams, 2013; Frey & Osborne, 2013), receive higher pay (than routine labor), have various unique skills, and create higher value (than routine labor). This market bears a resemblance to the classic labor market where the supply and demand of labor and skills play their classic economic roles. In this labor market, capital investment and technology can potentially, and will, substitute for most of the jobs (most of them in services), but can also be complementary. Such a substitution will occur due to effectiveness, efficiencies, quality assurance and financial profitability concerns, and as a result, the wages and value will fluctuate in response to market, technology, skills, costs, and investments (Acemoglu & Autor, 2012). This middle ground, as proposed by Acemoglu and Autor (2012), includes low-, medium-, and high-skilled labor, and the distinction between the three segments is a function, changing over time, of technology and investment in human capital (education, training, etc.), but is contracting due to technological advancements, global competition, and profitability pressures (e.g., Kolev & Saget, 2010; Canon & Marifian, 2013). The continuous pressure on this market is also the outcome of the gaps between the productivity and costs share of labor and energy, and the low cost of the mixture of energy and capital in comparison to the high cost of labor (Kümmel, 2011, p. 245). The mid-ground of this market suffers from a mismatch of supply and demand, and companies might have to step in, lead and nurture proactively the revival of middle-skills jobs (Accenture, Burning Glass, & Harvard Business School, 2014). Moreover, at the high end, complementary segment of this market there is a positive interaction between skills (existing) and technology (Acemoglu & Autor, 2012).

This labor market is also susceptible to a trap, the ‘middle income trap’. The notion here is different from the classic economic term which refers to a country (e.g., Felipe, 2012). The individual’s middle income trap is a result of the combination of the shrinking half-life of knowledge and the imposing need for continuation of investments in one’s human capital as well as being pressured for conformity to the accepted norms and repertoire (e.g., Durand &

43 See for example, http://www.slate.com/blogs/browbeat/2014/10/10/germany_college_is_free_there_even_for_foreign_students_why.html
44 e.g., Acemoglu, 2011.
45 See for example Frey, 2015; Kotler, 2015.
46 This notion of the trap is supported by the diminishing probabilities of social and economic mobility of the majority of employees regardless of their demographics, etc. (e.g., Molloy, Smith, Trezzi, & Wozniak, 2016).
Kremp, 2016). This requires time and money to support the needed space of learning. Time and money are also needed to support the expected middle class lifestyle (e.g., Kotler, 2015). Those conflicting demands on both the time and money of the skilled labor, result in falling behind on keeping up with the need to upgrade skills and knowledge. This then translates into the need of increasing one’s working hours at a lower (relatively) income, due to the declining negotiating power of a less and less relevant set of skills, as well as the global competition of low cost skilled labor and technology.

To summarize, here are the characteristics of the skilled labor market:

**Description**

Employees have medium range and complex codified or codifiable skills and medium or high levels of post high school and undergraduate education and are employed in jobs paying medium salaries (above living wage), subject to the supply and demand forces of the labor market.

**Current situation**

- Not a very efficient labor market, with some markets having big mismatches between supply and demand.
- Short and shrinking half-life of knowledge resulting in creation of new jobs and new needs for knowledge and skills created; pushing for higher cost of education and new degrees developed.
- Lack of effective and efficient internal to the company labor markets.

**Future under current economic and legal system**

- Due to high cost of skilled-labor, and/or shortage of skilled-labor and the growing pace of job complexities and knowledge needed, this market is at the highest risk of human labor being replaced by the 1st and 2nd generation of Robotics +AI technology, since here the return on investment will be much higher than in the routine labor market.
- Increased cost of higher education.
- Increased inefficiencies and ineffectiveness of labor markets.
- New jobs will be created at the higher end of skills needed while at the lower end, jobs mostly will be destroyed by the complementarity of technology and low cost routine labor.

**Solution recommended**

- Smarter labor legislation needed-less restrictions in Europe (more/less/different) elsewhere.
- Legislation and policies affecting: taxation, mobility, education and training supporting effective and efficient labor markets.
- Creation of vertical exchanges of alternative digital currencies and local and regional various forms of decentralized autonomous organizations to create the appropriate ecosystems (e.g., space of learning, resources) for long-term survival and growth (see more later).

---

47 See also ‘knowledge trap’ (Jones, 2010).
48 See also the ‘Concept of Ba’ by Nonaka & Konno, 1998.
C. Talent market

The talent market (see Figure 2, C at time T2) as defined earlier (Russ, 2014a), is an inefficient labor market, a market failure (Bator, 1958; Ouchi, 1980; Hidalgo, 2015, p. 113), since the value of the product is weakly captured by its price, either because the skills or tasks entailed to produce it are tacit49 (e.g., Autor, 2014) (not codifiable) or because the uncertainty50, risk, and value are difficult, if not impossible, to ascertain (e.g., Cattani, Dunbar, & Shapira, 2013; Martin, Gomez-Mejia, & Wiseman, 2013) and the price in many cases is driven by star branding or/and reputation and status (Sum & Jessop, 2012; Ertug, Yogev, Lee & Hedstrom, 2016; Kilduff, Crossland, Tsai, & Bowers, 2016). Also, at least in some cases, even though the value of the market is extremely high, the number of buyers and sellers is very limited (see example in Driskill & Vrooman, 2016). Talent is a rare commodity; takes a long time to develop and master (Colvin, 2010, pp. 168-169; Kaplan & Rauh, 2013, pp. 48-52); requires special considerations, for example, deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993); and intrinsic motivation complemented by extrinsic motivation and investment (Colvin, 2010, pp. 61-63, 133-136, 188). Counterintuitively, in the knowledge driven economy, when the half-life of knowledge is shrinking, the time required to master the needed knowledge is longer and the investment is larger. No wonder companies cannot find the talent they are looking for; they have to take the time, risk, and make a commitment to invest in talented and motivated employees in order to develop the talent they need to succeed in the ‘creativity economy’ (Dubina, Carayannis & Campbell, 2012). The talent market has a very distinctive characteristic from the previous two markets (routine labor and skilled labor) and operates similar to the increasing-return, winner takes all, economy (Arthur, 1989; Maier, Pfeiffer, & Pohlmeier, 2004; Frank & Cook, 2013), either because of imperfect (asymmetry of information, risks) internal and external markets51, because of financial (Philippon & Reshef, 2012) and non-linear characteristics52, the “stickiness” (Szulanski, 1996) and embeddedness of tacit knowledge53, or because of an external networking effect54. As a result, for example, in the United States, college educated individuals are working longer hours (Thompson, 2015) and the income of the highest-earning one percent of workers almost doubled between 1991 and 2007 (Haskel, Lawrence, Leamer, & Slaughter, 2012), while in Australia, the most successful artists are working less hours in the art labor market (than less successful artists; Rengers, 2002, p. 140). Moreover, in the talent market there is a positive ‘deep’ interaction between skills (existing and new55) and technology (Kaplan & Rauh, 2013, p. 50).

49 Resulting in a higher potential for value appropriation (see Nahuis & Smulders, 2002).
50 Such markets have the potential for scalability (see example in Kaplan & Rauh, 2013, p. 48).
51 See for example, the exuberant incomes of CEOs: Bertrand & Mullainathan, 2001.
52 e.g., “butterfly effect,” see example from the art market in Salganik, Dodds, & Watts, 2006; high scalability (Kaplan & Rauh, 2013, pp. 48); criticality due to the pace of innovation (Kim, Park, & Yook, 2016).
53 What Hidalgo, 2015 calls “knowhow”.
54 See the extremely high earnings of star performers, athletes, etc.: Ertug & Castellucci, 2013; Rosen, 1981; or the impact of the nature of externalities involved, and the size and scalability of the network (e.g., Torrent-Sellens, 2015).
55 See example in Rengers, 2002; chapter three.
One possible risk this market presents is the ‘luxury trap,’ (Hudders, 2011). The high cost of luxuries and the rewarding nature of luxury consummations impose a lifestyle that limits the time and the access to diverse inputs so crucial for creativity and experimentation, and talent development\textsuperscript{56}.

To summarize, here are the characteristics of the talent market:

**Description**
Employees have highly uncodified, tacit, and complex (multidimensional set of) skills and a medium or high level of postgraduate education They are employed or creating extremely high paying salaries and wealth (top 5% or less\textsuperscript{57}), subject to ‘suppliers win all’ dynamics. Think for example of top athletes, superstars, actors, CEOs, financial market traders, successful entrepreneurs, etc.

**Current situation**
- Extremely inefficient and ineffective labor market, with significant asymmetries of information and very small, volatile and uncertain, fast paced, badly defined, and regulated markets.
- Short and shrinking half-life of knowledge resulting in new jobs and new needs for creativity, knowledge, innovation and skills created; cost of education is of less relevance, while creativity, performance and luck play a critical role in the winner take all competition.
- Completely ineffective and inefficient, internal to the company, labor markets.

**Future under current economic and legal system**
- Growing share of income, driving economic, social and educational inequalities to new heights in recent memory.
- Least at risk of being replaced by robotics and AI.
- Creating new jobs with high-end, increasingly complex skills and performance needed.

**Solution recommended**
- Recognize that legislation of talent might be socially and economically desirable, since it may improve talent allocation (Ferreira & Nikolowa, 2015).
- Manage and legislate by exception\textsuperscript{58}, similar to monopolistic markets, realizing that you cannot legislate the markets for top artistic or athletic talent, the same way you legislate top financial management or corporate executive talent\textsuperscript{59}, while providing a floor (guarantee minimal income) to support risk taking and experimentation (e.g., Frey, 2015).
- Create personalized and autonomous teams’ alternative digital currencies (see Russ, 2014b for additional discussion).

\textsuperscript{56} See ‘knowledge trap’ as well (Jones, 2010).
\textsuperscript{57} See also George, Dahlander, Graffin, & Sim, 2016 (p. 8) estimations of between less than 1% to up to 8%.
\textsuperscript{58} Similar to how governments should regulate monopolies; see for example, Dewatripont, Rochet, & Tirole, 2010; Alexander, Baptista, & Yan, 2012.
\textsuperscript{59} See an interesting discussion in Martin, 2014.
Labor Markets - Summary

To summarize, I postulated that the curve of value added from (and for) the firm (internal market/firm specific not transferable) and the individual (external market/transferable) as a function of skill percentile is not only exponential, but as a function of time, is becoming more so, and as such, the economic inequality, and the social gaps and polarization (winner takes all) are growing (see above). I also suggested that artificial intelligence and robotics technologies, and the accelerating shrinking of the half-life of knowledge are primarily putting (and will continue to) pressure on the skilled labor because of the bigger potential benefits and higher returns to the firm and to the producers of the alternative solution delivered by means of artificial intelligence and robotics while replacing codified, skilled jobs. Replacing talent at this stage of development is still too costly and in many cases the technology is not there yet, so the most practical and economical approach is to tackle the middle (e.g., Autor, 2010; Kolev & Saget, 2010; Canon & Marifian, 2013). Davenport and Kirby (2015) recently suggested reframing the threat of losing jobs in this labor market with an ‘Augmentation’ strategy and described five different approaches toward employability that are optional to individuals and companies. Two of them (‘step up’ and ‘step in’) require additional skills (still in B). Two of them require skills that are not codifiable yet (‘step aside’ or ‘step narrowly’) (could be in B or C) and the last one (‘step forward’) requires both additional skills and non-codifiable skills (could be in B or C). Most of those options require (as mentioned earlier) higher education, life-long learning, and creative skills that are increasingly hard to find. Therefore, the low-cost, inefficient routine labor market is synthetically maintained by the government and the legislator (for political reasons—the people still can vote) and the dominant elite (buying social peace); the high-end (talent), market is not efficient. The only market somewhat economically efficient, (but shrinking) is the skilled labor market, the one in the middle. The inefficiencies of the three labor markets come at a high price. The economic inequality is the highest it has been in recent (some say longer) history. Also, the efficiencies are unacceptably low. For example, Kümmel (2011) estimated output elasticities for labor to be between 0.09 and 0.15, and for creativity to be between 0.10 and 0.19, in comparison to output elasticities for capital to be between 0.18 and 0.51, and energy to be between 0.35 and 0.73.

Table 1 below summarizes some of the characteristics of the three distinct labor markets.

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60 See also Kotler, 2015, pp. 29-61.  
61 See also Gorz, 1982; Levy & Murnane, 2012; Davenport & Kirby, 2015.  
62 Even though IBM’s Watson is getting smarter and cheaper; Kroeker, 2011.  
64 See Kümmel, 2011, p. 212, table 4.5 - from a different perspective.  
65 For Germany, Japan, and the United States, for the second half of the last century.
Table 1 – The three distinctive labor markets: Comparison

<table>
<thead>
<tr>
<th></th>
<th>Routine Labor</th>
<th>Skilled Labor</th>
<th>Talent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decreasing Return Economy</td>
<td>Decreasing return economy</td>
<td>Increasing return economy</td>
</tr>
<tr>
<td><strong>Competition</strong></td>
<td>Monopolistic and/or Oligopolistic driven by demand</td>
<td>Supply meet demand – imperfect</td>
<td>Monopolistic and/or Oligopolistic driven by supply</td>
</tr>
<tr>
<td><strong>Role of Law</strong></td>
<td>Controlling Monopolistic and Oligopolistic firms</td>
<td>Framing competition</td>
<td>Responding to individuals and firms on the frontier</td>
</tr>
<tr>
<td><strong>Accepted social norm of human capital</strong></td>
<td>Minimum, living wage</td>
<td>Disappearing middle class</td>
<td>Role models, stars</td>
</tr>
<tr>
<td><strong>Social science theories of employability</strong></td>
<td>Conflict theory</td>
<td>Positional conflict theory</td>
<td>Consensus theory</td>
</tr>
<tr>
<td><strong>Technology relevance</strong></td>
<td>As substitution – minimal</td>
<td>Complementary – drives demand horizontally (scope) and vertically (deeper) for skill at the high end</td>
<td>As substitution - Minimal to none</td>
</tr>
<tr>
<td></td>
<td>As complementary – minimal</td>
<td>Substitution -replace at the low and middle end</td>
<td>As complementary – codevelopment</td>
</tr>
<tr>
<td><strong>Information asymmetry</strong></td>
<td>Minimal at best-known</td>
<td>Some-knowable</td>
<td>Major-some knowable, some unknowable</td>
</tr>
<tr>
<td><strong>Ideas per capita; Probability of discovering new idea per capita per time unit</strong></td>
<td>Minimal at best</td>
<td>Function of education</td>
<td>Very high within few narrowly defined areas</td>
</tr>
<tr>
<td></td>
<td>Function of IHC and SC</td>
<td>Optimum</td>
<td>Maximum (within a scope)</td>
</tr>
<tr>
<td><strong>Elasticity of substitution between financial capital (technology) and human capital</strong></td>
<td>Less than 1</td>
<td>Higher than 1</td>
<td>Highly significant in narrowly defined areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not relevant in others</td>
</tr>
<tr>
<td><strong>Depreciation of human capital</strong></td>
<td>Minimal</td>
<td>Significant</td>
<td>Varies significantly on different dimensions</td>
</tr>
<tr>
<td><strong>Relative weight of Human Capital in company’s Market Value</strong></td>
<td>Minimal; &lt; 5%</td>
<td>Medium 10% - 20%</td>
<td>High &gt; 33%</td>
</tr>
<tr>
<td><strong>Most appropriate production function</strong></td>
<td>$Y = (K, L)^{11}$</td>
<td>$Y = (K, L, H, I)^{12}$</td>
<td>$Y = (K, H, I)^{13}$</td>
</tr>
<tr>
<td><strong>Capital (technology) and skill complementarity in services</strong></td>
<td>Complementary</td>
<td>Substitution</td>
<td>Complementary</td>
</tr>
<tr>
<td><strong>Capital (technology) and skill complementarity in goods/manufacturing</strong></td>
<td>Substitution</td>
<td>Complementary</td>
<td>Complementary</td>
</tr>
<tr>
<td><strong>Traps</strong></td>
<td>Poverty</td>
<td>Middle Income, Knowledge</td>
<td>Luxury, Knowledge</td>
</tr>
<tr>
<td><strong>Typical statistical analysis and distribution</strong></td>
<td>Linear - uniform distribution</td>
<td>Mean, average - normal distribution</td>
<td>Frontier analysis-power distribution</td>
</tr>
<tr>
<td><strong>Game theory</strong></td>
<td>Mostly negative-sum games</td>
<td>Mostly zero-sum games</td>
<td>Mostly positive-sum games</td>
</tr>
<tr>
<td><strong>Alternative Digital Currencies</strong></td>
<td>Not Applicable</td>
<td>Exchanges</td>
<td>Personalized</td>
</tr>
<tr>
<td><strong>Typical network</strong></td>
<td>Centralized</td>
<td>Decentralized</td>
<td>Distributed</td>
</tr>
</tbody>
</table>

69 e.g., Jones & Romer, 2009.
70 e.g., Lise & Postel-Vinay, 2015.
72 Based on for example Kaplan & Rauh, 2013.
73 K=Financial capital; L=Labor; H=Human capital; I=Ideas.
74 H-human capital is practically irrelevant, (cf. Daniels, 2013).
75 See example of discussion in Jones, 2005; Lucas, 2009; Alvarez, Buera, & Lucas, 2008; Daniels, 2013.
76 L-labor is practically irrelevant.
77 Reshef, 2013.
78 Reshef, 2013.
79 e.g., Stapleton, O'Day, Livermore, & Imparato, 2006.
80 e.g., Felipe, 2012.
81 Jones, 2010.
82 Hudders, 2011.
83 Jones, 2010.
84 e.g. Garcia-Castro, & Aguilera, 2015.
85 Kelly, 2015.
86 Kelly, 2015, pp. 133-134.
87 Kelly, 2015, p. 67.
Acknowledging the notion of three very different labor markets with diverse dynamics and economic rules should illuminate the present (2016) discussion in the United States (and elsewhere) about the need for a minimum (or living) wage or universal income, the astronomical growth in economic inequality, and the shrinkage of the middle class. In line with such rationale, for example, the CBO (2014) recently suggested that increasing the minimum wage could result in hundreds of thousands losing jobs while increasing income for millions. A question not considered yet is how many potential employees, that presently are out of the employment statistics (since they dropped out from the labor force), will return to the routine labor market and look for jobs, which could paradoxically increase the rate of unemployment and underemployment, but will also potentially increase the GDP. The other less-discussed consideration is the expected impact that the increase of minimum wage will potentially have on the skilled labor market (marginal at best in my opinion), which should be seen as further evidence of the two markets being (almost completely) disjointed.

One way to validate the proposition as listed above is to look into the social and geographic mobility of individuals, employees and firms. If the three labor markets are indeed distinct, then the “rules of the game” in each one will be different. The lack of (or minimal) social and geographic mobility in the routine labor market (Bosker, Brakman, Garretsen, & Schramm, 2012; Machin, Salvanes, & Pelkonen, 2012; Partridge, Rickman, Olfert, & Ali, 2012; Gill, Koettl, & Packard, 2013) and the ease of social movement and global mobility of the stars and talent are well documented (e.g., Filatotchev, Liu, Lu, & Wright, 2011; Currid-Halkett & Ravid, 2012; Haskel, Lawrence, Leamer, & Slaughter, 2012), and their externalities go far beyond the traditional returns (e.g., Oettl & Agrawal, 2008). Lastly, the professionals (the middle, skilled labor) seem to follow their own social and geographic mobility mechanisms.

Finally, let me postulate how entropy and the new definition of human capital proposed elsewhere (Russ, 2014b; Russ, 2016) can play a different role in the three distinct labor markets mentioned above. The function of management (skilled market—see Figure 2, B at time T₂) can be articulated as a complexity reduction task between the selected environment (strategy, measured as entropy) for the individuals that deliver the value, when creating it for customers. Effective and efficient management minimizes the entropy, allowing the employees to deliver the product/service while traversing with minimal noise/complexity/entropy. If the amount and scope of complexity (entropy) the employees are engaged with is minimal and decreasing as a result of use of technology, we are in the routine labor market (see Figure 2, A at time T₂). If the amount and scope of complexity (entropy) the employees are engaged with is above the minimum threshold and varies over time, and the employees have some control over the scope of entropy, then we are in the skilled labor market (see Figure 2, B at time T₂). When the

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89 See also Bolton & Dewatripont, 1994 for a model of an organization as an information processing entity where efficiency of information processing is a result of organizational structure.
90 See additional discussion on employer learning in Habermalz, 2010.
91 e.g., by using feedback or implementing information systems.
92 See additional discussion on leadership and coordination in Bolton, Brunnermeier, & Veldkamp, 2013.
93 Think fast food or retail service occupations.
actors have a substantial amount of control over the scope of complexity (entropy), including the choice of increasing entropy, at least temporarily, the timing of such exploration and the ability to optimize (not minimize) the entropy, at least in one dimension of their multidimensional set (space) of skills, then we are in the talent market (see Figure 2, C at time T2) which could result in a new or modified niche (eco-system).

**Labor markets: framework**

To summarize the discussion above, the following framework for the three labor markets is conjectured. The framework includes the aspects (dimensions) along which the trifurcation takes place (or potentially will take place), as proposed above. The proposed framework (see Figure 3 below) includes four major aspects of the labor markets of human capital in the networked, knowledge-driven, global economy: (1) Environmental factors; (2) Task factors; (3) Human capital factors; and (4) Value factors.

![Diagram: Trifurcation framework: The four factors](image)

Let’s now list the major aspects of the four factors, based on the discussion above, in the three labor markets.

---

94 See example of such multidimensional space of skills at Lise & Postel-Vinay, 2015.
95 See additional discussion in Handscombe & Patterson, 2004.
97 The referencing in section is minimized since the different aspects were already discussed earlier in this paper.
Table 2: Trifurcation framework: The four factors and their characteristics

<table>
<thead>
<tr>
<th>Ontology</th>
<th>Routine Labor</th>
<th>Skilled Labor</th>
<th>Talent</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Environmental factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Technology nature</td>
<td>Substitution</td>
<td>Substitution/Complementary</td>
<td>Complementary</td>
</tr>
<tr>
<td>b. Technology’s Half Life of Knowledge</td>
<td>Long</td>
<td>Medium</td>
<td>Short</td>
</tr>
<tr>
<td>Holistic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Business markets nature</td>
<td>Competitive</td>
<td>Oligopolistic</td>
<td>Monopolistic, Winner-Take-All</td>
</tr>
<tr>
<td>d. Business market size</td>
<td>Large</td>
<td>Medium</td>
<td>Small</td>
</tr>
<tr>
<td>e. Uncertainty, risk</td>
<td>Small</td>
<td>Medium</td>
<td>Large</td>
</tr>
<tr>
<td>Organizational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Task factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Complexity</td>
<td>Simple, routine</td>
<td>Mix</td>
<td>Complex, nonroutine</td>
</tr>
<tr>
<td>b. Number of dimensions of skills needed</td>
<td>Few</td>
<td>Medium</td>
<td>Many</td>
</tr>
<tr>
<td>c. Organization of work</td>
<td>Simple, bureaucratic, hierarchical</td>
<td>Mix</td>
<td>Complex, organic, informal</td>
</tr>
<tr>
<td>d. Nature of skills needed</td>
<td>Codifiable</td>
<td>Mix</td>
<td>Tacit</td>
</tr>
<tr>
<td>Operational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Human capital factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Numbers</td>
<td>High</td>
<td>Medium</td>
<td>Small</td>
</tr>
<tr>
<td>b. Bounded rationality</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>c. Skills dimensions</td>
<td>Few</td>
<td>Medium</td>
<td>Many</td>
</tr>
<tr>
<td>d. Learning capacity</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>e. Matching capability</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>f. Mobility</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>g. Skills nature</td>
<td>Codifiable</td>
<td>Mix</td>
<td>Tacit</td>
</tr>
<tr>
<td>h. Opportunism</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Instrumental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Value factors.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Value creation</td>
<td>Small</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>b. Value appropriation</td>
<td>Small</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Selected Ramifications

One might expect that new technologies (nano, bio, media, 3D printing, etc.) will create new opportunities, and, provided time, new jobs will be created as well (e.g., Levy & Murnane, 2012; Brynjolfsson & McAfee, 2014; Invernizzi, 2014). The caveat is that most of those jobs will require a much higher level of skilled labor (graduate education) or a mix of skills and creativity that only the star/talent employees might have. However, even this prediction is changing, since this is where artificial intelligence technology will replace skilled labor, (e.g., Banks & Humphreys, 2008; Rotman, 2013; Frick, 2015), so the spillover (if any) as an opportunity of new job creation in the routine labor market will be minimal at best, reemphasizing the need of legislation to proactively engaged in enabling the markets or directly create jobs for this segment, or alternatively, to move to a universal income, as more and more countries consider\(^98\) and visionary leaders\(^99\) suggest.

Complementing the mostly dysfunctional labor markets is the mostly negative (or nonexistent) role that legislation is performing regarding intellectual property and intangible assets (including of course human capital and assets). On

\(^99\) See for example Elon Musk, at http://mashable.com/2016/11/05/elon-musk-universal-basic-income/#xK0XU0uTmmqZ
one hand, the legislation in a few areas is too restrictive. For example, patents are granted for too long to support innovation (e.g., Heller, 2008), which also creates opportunities for patent trolls (e.g., Golden, 2007), or large companies that control the distribution channels, taking over small, entrepreneurial and innovative companies (e.g., Schweizer, 2005). On the other hand, many areas are not regulated at all, which not only makes it difficult for new markets to be created, and as such, limits the possibilities for ownership and capital investments or insurance protection, but also allows technology to dictate the roadmap and its owners (when successful) monopolistic profits.

Another interesting ramification of this analysis is that in light of the present legal and economic environment, we have to modify the way we consider the majority of SMEs. The contemporary economic and business literatures view those companies as drivers of innovation and job growth. In reality, the vast majority of the SMEs are part-time or full-time, single or less-than-five employee, companies. I would propose viewing them not as an attempt by the entrepreneur to build a firm while exploring the benefits of future opportunities, but as an attempt to capture and capitalize on one’s (specifically the middle-ground skilled labor individuals mentioned previously) human and social capital (Baumol, 2010, p. 156; Kaul, 2013; cf. also with Hampden-Turner & Trompenaars, 2015, Ch. 6). If this proposition is supported, the explanation for the large number of women and minorities hitting the glass ceiling and leaving their present place of employment is not because they identified a new business opportunity, but because they identified the ownership option as the best choice to capitalize on their experience and social capital, which is significantly better than the working-for-a-corporation option or the unemployment or underemployment options (Pofeldt, 2016). Regrettably, the significant majority of routine labor (see above) does not control or own the capital (financial, human, or social) needed for such embarking, and as such, they are immovable in their job (underemployed) or are unemployed, or choose to participate in the gig-economy as necessity entrepreneurs.

Lastly, is the distinction between value creation and value appropriation (e.g., Mizik & Jacobson, 2003). It is naïve and wrong to assume that all value creators are fairly compensated by the markets. This is where power, opportunism, and/or status plays a key role in value distribution and appropriation. As such, not all creative, risk taking and value creating skilled labor and talents are fairly or highly compensated, while others are overpaid, adding to the dysfunctionality of labor markets. Industry specific policy and legislative interventions are strongly encouraged to support fair compensation and minimized the risk of race to the bottom similar to what is occurring in the routine labor markets.

Limitations, next steps and research gaps

Narrative and selective literature reviews have major limitations, among them, unsystematic and subjective methods to search for, assemble and interpret biased information without critical appraisal, and with a specific hypothesis in mind, summarized with a convenient narrative. To minimize those weaknesses the authors triangulated

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100 See example in Williamson, Watcher, & Harris, 1975.
101 An additional layer of complexity is added by the variability of the unique markets; same talent might be valued significantly differently by two different markets; see example in the art markets (Ertug, Yogev, Lee, & Hedstrom, 2016).
102 See an example in Fields, 2007.
multiple perspectives from the economic and business literatures, presented the models at number of seminars, and sought out feedback from a number of experts in this field (see Figure 1 and acknowledgements below).

Enacting a formal model that will use the new definitions of capitals (see Russ, 2016) and the three labor markets simultaneously should be the next step. One starting point could be the model of problem-solving producers proposed by Lucas (2009). In his model (α)\(^{103}\) is the rate (individual’s own ability and effort) at which ideas are processed, (λ) and (θ) are respectively the quality (knowledge, as a function of time [t]) and the diversity of the environment\(^{104}\). What the discussion above is suggesting is that ability and knowledge are multidimensional (see also Guvenen, Kuruscu, Tanaka, & Wiczer, 2015; Lise & Postel-Vinay, 2015) and the environment for each one of the three markets has different characteristics, including the multidimensionality\(^{105}\) of the competitive labor market landscape. Incorporating such a multidimensional space into the winner-take-all human capital markets (see for example the model developed by Frank and Cook, 2013) may allow quantitative analysis of what specific aspects or skills enable talent actors to win it all\(^{106}\), as well as what makes them different from skilled actors who seem to operate/act in the same industry niche but, in actuality, are operating in a ‘richer’ space (see example where such models can be used to resolve research gaps in the art markets, as in Rengers, 2002 for the talent-skilled markets proposed here and in Menger, 2006 for the skilled-routine markets proposed here).

The paper also suggests a number of research gaps that will be briefly discussed here. The most glaring is the need to study the overeducated and underemployed. The current statistics of underemployment focus on the most simplistic (and may I say “old economy”) aspects of underemployment: hours. People looking for a full time job that are working part time jobs. The fast growing issue worldwide is the individuals that have higher education and are either unemployed (there is statistical data about that) or underemployed since the jobs they take do not require the level of education they possess. This is an economic waste, a social welfare setback, and in many cases, a personal disaster. The first step must be a “better” data collection system, including metadata that must be put in place to learn about the size, and other critical aspects, of the issue and also to enable studies to support future policies.

The second issue is the role of globalization in accelerating the process trifurcation. This paper assumed that it is the accelerating pace of the waves of technological revolutions that is driving this global phenomena. To economists, the long term benefits of open borders for investment and trade are clear. To labor economists, the short term impact on labor is mixed at best, but for policy making purposes, more research needs to done on the intersection of globalization and technology.

For research purposes, critical dilemmas are those of the appropriate units of analysis. Geographically, cities and megaregions seem to be the drivers of economic, demographic and social growth and change. For policy making and legal perspectives and funding, the state nations (federal and lower levels) are still the governing bodies. Then, there

\(^{103}\) Lucas, 2009, p. 5.

\(^{104}\) Lucas, 2009, pp. 5, 6; Alvarez, Buera, & Lucas, 2008, p. 4.

\(^{105}\) Number of dimensions, scale and scope.

\(^{106}\) See also the concept of profit pool (Gadiesh & Gilbert, 1998).
is the issue of industries. New scientific areas and industries are created at a breathtaking pace, while old industries decline, restructure or combine with others. Formal, valid and reliable data collection to support diverse and new units of analysis are years behind, so how should the researcher proceed?

This paper suggested that imperfect competition is everywhere. Is it different in the three labor market? The paper suggested that different dynamics operate in each one of the three. Do the dynamics change over time? Are the dynamics different at different segments?

Immigration was one of the areas that early identified bifurcation in the labor markets, and traditionally was treated by economics and by labor economics, separately from globalization. At present, this is a hotly contested political and social issue. So what role does immigration play in the three different markets?

Lastly, and most intriguingly, from pure research curiosity, are the micro-foundations of the mechanisms within each market and the research methods and tools used to study them. One distinction clearly made in this paper (see Table 1) is that each market must be studied by different methods and more importantly, the statistical methods and tools must be different. So, to develop formal models for the three markets and test them with the appropriate tools will be the ultimate test of the proposals introduced in this conceptual paper. On the other hand, the paper is suggesting (see Table 2) a large number of factors (dimensions) enabling the trifurcation. Which are the few that really enable the trifurcation? Are they the same in all industries?

The networked, knowledge-driven, global economy is nothing like what humans faced in the past (e.g., Russ, 2016). The realization that the labor markets are going through a major phase transition through trifurcation might make the transition easier, the policies and legislations more effective, and minimize the social and economic negative consequences.

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