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Towards Better Economic Models of Social Behaviour? Identity Economics

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Abstract

In recent years, a growing literature emerged studying the role of identity in economics. Yet, mainstream economists and other social scientists still eye identity economics with suspicion. This article illustrates the underlying assumptions of identity economics, gaps in the literature, as well as existing tools and research in other domains of economic theory that help to close these gaps, while demonstrating that identity economics is able to provide sophisticated approaches and additional findings that support transdisciplinary research on the topic. In order to demonstrate how these tools can be used to study the complex social systems in which identity, preferences, and institutions co-evolve, I develop a number of simple analytical models and elaborate on their implications, while keeping technicalities to a minimum. In addition, I show how findings in behavioural economics apply to identity economics and prove insightful for our understanding of the complex interdependencies between identity and group formation.

Introduction

With the rise of behavioural science, economic theory is currently abandoning the simplified understanding of individuals as *homines economici* while feeling the need for a proper recognition of human behaviour. The neo-classical perspective reduced individual choices to preference orderings under exogenous constraints, based on which an individual then maximizes his wellbeing by consistently choosing an optimal consumption pattern. Heterodox approaches, on the other hand, no longer perceive individuals as purely self-concerned and atomistic, but as other-regarding social beings. Behavioural economics enriched our understanding of human nature and has provided fruitful avenues for theoretical extensions to date. Yet, it also opened Padora's box, which has left economists struggling with a way to fill the gap. Trapped between *homo reciprocans*,

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cooperativus, and *irrationalis*, it is unclear which elements of behaviour are to be integrated into our models in order to offer an appropriate description of human decision-making while keeping it analytically tractable. Numerous psychological aspects have been studied and integrated into models of social preferences, but only fairly recently have economists discovered the importance of identity. With the exception of a few earlier approaches, which indirectly addressed the role of identity (Becker 1976; Bernheim 1994; Kirman 1992, 1997; Potts 2000; Sen 1973), the concept only explicitly entered into economic theory and modelling with the work of Akerlof and Kranton (2000).

This is even more surprising because identity has shaped most economists' ideology for many decades in the form of an adherence to a specific school of thought. This ~~wilful~~ ignorance and denial to tackle the issue of identity may be explained by the major challenges that identity poses to economic theory. Embracing identity may imply a renunciation of the fundamental axioms of rationality. The impact of identity on decision-making goes beyond an individual's definition of his personal identity, i.e. what he aspires to be. It also includes his belief of how he is perceived by others and the expectations that go along with it. Choosing a type of education, a profession, or living in a specific district does not only depend on what an individual believes is adequate, but also how his peers judge his decision. In addition, an individual projects his identity into the future. These projections influence the results of inter-temporal decision-making processes. They clearly affect current choices, as well as the formation of an individual's identity, potentially leading to intransitive behaviour and intertemporal inconsistency. In addition, the interrelation of these aspects leads to a co-evolution of numerous variables, constituting a complex social system in which dynamic preferences evolve endogenously.

This complexity is not easily handled, but a number of analytical tools, which are on their way to entering mainstream economics, can improve our understanding of identity, especially the mechanisms behind identity formation and the consequences for individual actions and welfare. These tools are (evolutionary) game theory, network (or graph) theory, and agent-based modelling. The aim of this article is thus not to provide a comprehensive overview of the existing economic literature. This has been done elsewhere (see, e.g., Akerlof and Kranton 2010; Kirman and Teschl 2004). The purpose here, however, is to elaborate some shortcomings in the literature and to show in which way existing concepts and tools can be applied to the context of identity to fill these gaps. Therefore, I will not study a single phenomenon in detail, but will sketch a few models by applying these analytical tools and providing an illustration of how the integration of identity can improve our study of behaviour. This is not only of interest to economists. I therefore reduce technicalities to a minimum, hoping that the tools and examples I illustrate here will also be of interest to other social scientists. As we will see, the evolution of identity and identity groups is characterized by complex behaviour with interesting evolving properties. Particularly, the simulation of dynamic interactions among individuals based on computational models – so-called agent-based modelling – will serve as a proper tool to analyse and study the intricacies of such complex social systems.

Club Goods with Universal Benefits

Identity economists most frequently define identity simply as a set of individual characteristics. However, the different aspects of identity are not consistently defined in the economic literature. Here, I will use the term *personal identity*, if these characteristics refer to the individual's perception of what he is, desires to be, or his aspiration of what he will become (see also Horst et al. 2005). An identity group is then a collective of individuals who are subjected to its norms and conventions, and whose members perceive themselves as having the same or similar identity. Either the ideal set of characteristics (the archetype), as defined by the group, or its average set of characteristics (the average member) defines a group's *social identity*. Economic literature studies two principal questions in the context of identity: 1) the motivation and primary decision variables for becoming a member of an identity group, and 2) the subsequent consequences for the group's identity, its members, and the individual's identity.

Literature building on Akerlof and Kranton (2002) frequently examines the former question by looking at identity groups as club goods. Club goods contain a crucial feature of public goods. Benefits are non-rival; however, in contrast to public goods, club goods are excludable. Non-rival thereby implies the possibility of its simultaneous consumption by various individuals, i.e. the consumption of the good by one person does not negatively affect the ability to enjoy the good by another person.[1] This is the reason why club goods are sometimes defined as *spite* goods. Take cable TV as an example. More subscribers do not harm the quality of viewing, but club members need to pay a fee in order to be granted access. Excludable, on the other hand, illustrates that access to a club good can be restricted. In the context of identity, the club good approach follows the logic that individuals strive to become members of an identity group and are therefore willing to commit themselves by undertaking special deeds demanded by the group. Once accepted as a member, an individual is no longer excluded from the good (i.e. the benefit of membership) and can profit independently of his degree of devoutness, conviction, and actions in line with the interest of the group. Thus, individual contribution is not directly linked to individual benefit. This clearly entails a free-rider problem.[2] Since any supporting activity comes at an individual cost, members minimize efforts while not taking into account the positive effect (i.e. externality) their actions convey on other members. This take on identity groups as club goods renders the approach akin to existing literature on the economics of religion (for an overview of the latter, see Iyer 2016). Like other identity groups, religious groups devise cultural norms to which members abide and which are actively enforced by the group. Such mechanisms allow a group to impose additional costs on those members whose preferences are not in-line with the ideals of the group, thereby screening out members who are less willing to contribute and thus more likely to free-ride.

Akerlof and Kranton (2002) illustrate this process in the case of schooling. Students are urged to behave similar to a model student prescribed by the identity group. Consequently, a student will associate himself with a group based on how close his own characteristics are to the model – i.e. with the group in which he bears lowest costs to live up to expectations. In the context of religion, Iannaccone

(1992) and Berman (2000) argue that stigma is used by religious institutions to rule out free-riders, implying that strict churches suffer less from free-riding and have higher contributions by their members (see also Aimone et al. 2013). Prohibitions and norms can then be seen as a form of taxing actions that occur outside of an identity group.

The treatment of identity groups as club goods bears a number of shortcomings. This perception ignores that identity groups affect the shape of individual preferences (a point also raised in Horst et al. 2005). As will be illustrated in more detail below, behavioural feedback effects lead to a co-evolution of preferences and institutions that internalizes collective benefits into individual preferences. Thus, the social identity feeds back into the personal identity, mitigating the free-rider problem of public goods. Although stigma and social shunning are measures to put members back on the 'right' track, being raised with the group's moral code and being subjected to initiation rites and rituals aligns individual preferences with the group's identity. Hence, it is eventually not external coercion that causes an individual to commit group beneficial actions, but his choice is eventually intrinsically motivated. Stigma is then less a means of screening free-riders but to align preferences.

In a previous study, my co-authors and I (Mansour et al. 2014) tried to understand the inconsistency between the initial ideals of the Arab Spring revolution in Egypt (Bread, Liberty, and Social Justice) and the rise of the Muslim Brothers. We focused on the connection between education and identity formation and illustrated that prior to and during the Arab Spring, Egyptians felt increasingly alienated from the prevailing and dominant identity stipulated by the state. The initiators of the Facebook revolution in Egypt were mostly educated in British, French, or German private schools, which shaped their perception of human rights and individual liberty according to Western ideals. Based on a small survey, we found that, although most did not endorse the Sharia-shaped normative code of Egypt, students did not feel accepted by Westerners. Those from Western schools frequently identified themselves as fitting into neither worlds, and hence often found themselves in an intercultural limbo.[3] This limbo resulted from an incongruity between the ~~social~~ identity as perceived by the individual and the social identity as perceived by peers. Since an Egyptian ID identifies an individual's religion, most Egyptians found themselves being seen and treated as Muslim, yet did not share the religion's views and ideals, and understood themselves more as Western. On the other hand, students from public and private Muslim Brothers schools subordinated their morals and ideals to the Sharia jurisdiction, and therefore did not face this contradiction. Based on these, we elaborated an evolutionary identity model, which illustrates how a society can shift towards more conservatism in the presence of a large share of liberal citizens. On the basis of the same approach, we also studied the rational reason for leaving one's home country while being conscious of the potential clash of identities faced in the new host country.

Our survey further illustrates another issue. The club good perspective bears the weakness that it considers coercion as a means to *screen out free-riders* and to make these individuals contribute to a common good. Admittedly, the perspective

of a commonly beneficial good is valid in a broad context, such as for political groups, secret societies, interest groups, or some sectarian groups. For example, members of the eighteen recognized sects in Lebanon are very conscious of their and others' sectarian affiliation. Not only political positions and power are assigned according to sect, but also job offers and contracts in general. Yet, the assumption of a universal and common good for group members does not generally apply. Members can be born or forced into a social identity, which is in stark contrast to their personal identity. In this case, membership does not necessarily benefit, but harms an individual. Facing discrimination as a member of a lower caste in India or being born with a specific skin colour or ethnicity, as well as being subjected to restrictions as a woman born into certain religions are all examples that question the public good nature of identity groups in general and religions in particular. Similarly, some institutions and organizations are actively forcing an identity on individuals, not as a means to screen out free-riders, but to ensure control over subjects (as an example, see the Islamic State and for a discussion, see Ille and Mansour 2015).

Preferential Attachment and Coordination

The public good element of identity groups is not the only source of a common good or bad. Becoming a member of an identity group can also lead to evolving properties not deliberately created by members.

Schelling (1971) illustrates how a slight preference for a specific ethnicity can lead to complete spatial segregation. A completely mixed neighbourhood is inherently unstable even if individuals have a preference to live in mixed quarters. The only requirement for segregation is that an individual prefers to live in a neighbourhood with a share of n/m members (with n any number smaller or equal to any other number m) of the same ethnicity to a neighbourhood with a share of n/m members of the other ethnicity (for further details, see the simple model by Bowles 2006, ch. 2, or the detailed study by Pancs and Vriend 2007).[4] To see this, imagine a neighbourhood in which half of the population is red and the other half is blue. Inhabitants might prefer this situation to all other distributions; this state thus defines an equilibrium. However, this equilibrium is unstable (i.e. it is not an evolutionary-stable state). Once one neighbour decides to sell his house to a member of the other ethnicity, the neighbourhood will converge to a homogeneous state in which all neighbours are of the same ethnicity. Assume that one blue sells to a red. As a consequence, red constitutes a small majority. Every neighbour would have preferred most the completely homogeneous distribution, but now the neighbourhood is slightly more attractive to reds than blues. As a consequence, more houses will sell to reds than blues in the following periods and eventually the whole area will be segregated. This is not only an example of how individual preferences do not necessarily coincide with outcomes at the macro level. The dynamics easily apply to the context of identity and illustrate its strong impact on collective social choices. In the example, the final outcome is clearly less preferred to a heterogeneous environment. Moreover, this form of segregation is not exclusive to ethnic differences but can be driven by any variable

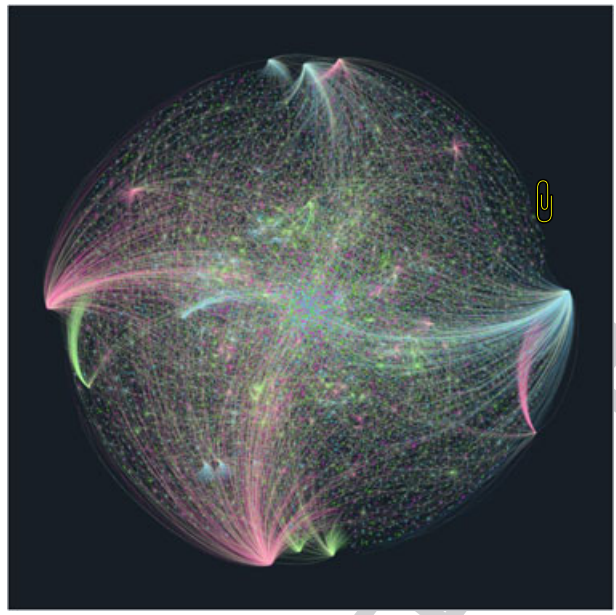
that sets one identity group apart from another. In addition, the Schelling model and its derivatives do not only apply to a spatial context, but relate to a vast number of different social scenarios involving different identities.

On the other hand, we observe that a preference for an identity group can lead to close-knit societies that can have positive or negative consequences. The following simple model provides an explanation for the evolution of such close-knit societies and will illustrate the consequences for individual decision-making. In networks of preferential attachment, the likelihood of newly formed connections depends on how connected existing members of the network already are. Somebody connected or linked to a large number of people is more attractive as a friend or acquaintance to a new member of the network than somebody who is connected to a limited group.[5] This provides a positive feedback to an already Q2 strongly connected individual rendering him even more attractive to others. We can see this phenomenon in a wide range of social networks encompassing friendship, as well as professional and political relations. Over time, connections in these networks tend to follow a power law distribution – i.e. very few individuals are connected to a large number of other people whereas the vast majority of the population is very weakly connected.

Ethnic segregation and preferential attachment can operate in different directions. An individual is drawn towards a person who is acquainted with a large number of other people and therefore has certain influence in the community. Yet, if this person belongs to another identity group, the individual faces a trade-off. On the other hand, a strongly connected member of the same identity group becomes even more attractive. Figure 1 illustrates the result of a **F1** simulation of such an augmented preferential network with approximately one hundred thousand individuals.[6] The graph should be read as follows: Individuals can have one of three colours (red, green, blue) categorizing their identity. Each individual is represented by a node (a circle) of corresponding colour. If two individuals of the same identity form a connection, the link (represented by the line connecting both nodes) has the same colour as the corresponding nodes. If two nodes of different identity connect, the link is coloured in white. We observe that by adding identity to the Barabási–Albert model of preferential attachment, the characteristic result for social networks with preferential attachment is preserved. On the one hand, very few nodes are linked to a very large number of other nodes. This can be seen in the strongly connected blue node on the right of the graph, and the red nodes at the bottom and left of the graph. On the other hand, the vast majority is connected to only few other nodes, forming small clusters of mostly less than twenty members. As expected, those nodes that are linked to a large number of other nodes are also attractive for nodes of other identities. Therefore, we see a mix or white and red links attached to the strongly connected red node at the bottom of the graph. However, if we zoom into the graph and look at the smaller clusters, we observe that those clusters are frequently homogenous in colour – i.e. members are mostly linked to other individuals who share their identity, and form a small community. Birds of one feather flock together, but only as long as their flock is sufficiently small.

Q3 **Figure 1. ■ [Colour figure can be viewed at wileyonlinelibrary.com]**

Colour online, B&W in print



This can increase efficiency. We know that individual contributions to public goods is negatively correlated with group size (also called the 1/N problem). However, the benefit conveyed on identity group members is not exclusively defined by the actual *good* produced within the identity group, but also by the ability of close-knit societies to coordinate better. On the basis of a spatial game-theoretic model (Ille 2014), I illustrate that interactions exclusive to a limited number of peers can improve coordination, if individuals chose their actions based on social learning.[7] Imagine a standard coordination game. Individuals are given the choice between an action that maximizes welfare for each member if it is adopted by the entire population, and a second action that maximizes an individual's *expected* welfare if he does not know which actions others are going to choose. The former action is payoff (or Pareto) dominant, whereas the latter is risk dominant. Individuals play this coordination game with no public signal or central planner. Therefore, each individual is unsure of whether his neighbours choose to minimize their risk or go for the risky solution, which increases overall efficiency. In the absence of social learning or interaction constraints, the risk dominant equilibrium is more likely to occur, reducing overall efficiency in the population (see Durlauf and Young 2001; Young 1993). In contrast, the efficient convention will evolve in the presence of local interaction and imitation – i.e. if interactions are limited to peer groups and individual choice is based on social learning. Nowak (2006) showed that this type of interaction can also explain partial cooperation in prisoner's dilemmas. Further, Bowles (2006, ch. 7) illustrates the positive effect of assortative mixing on cooperation in such

games. These are not only examples where less sophisticated agents are able to coordinate better but also examples that illustrate in which way identity-based segregation can improve coordination and efficiency among individuals.

Nonetheless, affiliation to an identity group can also harm an individual's well-being when leading to exploitative institutions between groups. This seems obvious for relationships characterized by an imbalance of power, such as between domestic workers and employers, or serfs and liege. However, the model on local interaction and imitation (see Ille 2014) illustrates that exploitative interactions can also evolve among two groups of equal bargaining power. Imagine a scenario in which some interactions take place exclusively between members of different social or ethnic groups (e.g. French fur traders trading with natives in the Great Lakes region). Assume as before that interactions are limited to a well-defined and small peer group, and choices are based on social learning. In a coordination game with two equilibria, one egalitarian, another strongly beneficial for one group and disadvantageous for the other group, we observe that the population will settle on the latter. Stable institutions evolve that are accepted by both groups, and in which members of the group gaining most over the egalitarian outcome can exploit members of the second group. An imbalance in bargaining power does not exist ex ante, but can be seen as a co-evolving and reinforcing property in this case. This is in stark contrast to commonly used models in evolutionary theory, which argue that two groups are more likely to converge to an egalitarian convention over time (Young 1998).

Social Movements and Fads

The former model assumed that individuals are simply imitating the most successful of their peers. Although this assumption is valid in various contexts, individuals are also affected by the number or share of peers they observe opting for a specific choice or action. Being part of a smaller identity group can then both positively and negatively affect social choice, depending on the context.

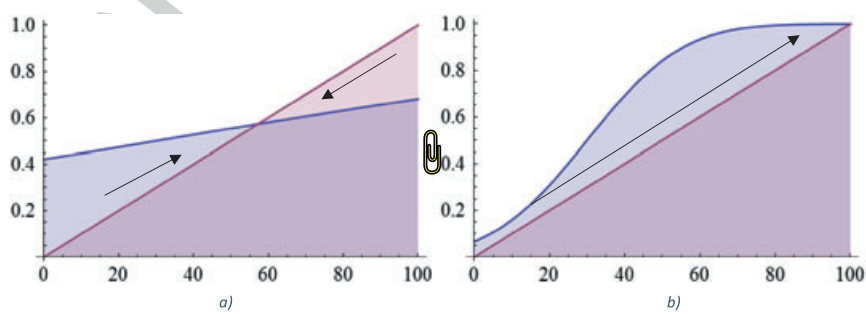
In July 2015, Lebanon's main landfill closed and waste collection was suspended by waste collector Sukleen. In the absence of any alternative, tons of trash were piling up at virtually any empty space in Beirut. Until Spring 2016, Lebanon experienced protests in some parts of the city, whereas other districts remained surprisingly calm. A number of these uprisings ended up in large demonstrations in August and October, as well as in spring of the following year. The following model provides an explanation of why only some areas experience upheavals and others not. It also ~~allows~~ illustrates the conditions potentially necessary to change a small upheaval into a large-scale demonstration.

Assume as before that individuals act as part of a group. Imagine that each group member has an individual threshold that defines the number of fellow group members he needs to observe in order to follow the same action or strategy. If an individual has a threshold of three, he will choose a strategy after having observed three other members choosing this strategy. In a group of one hundred people, we may assume, for example, that thresholds are uniformly distributed between zero and ninety-nine – i.e. there is one person with a threshold of zero, another with a

threshold of one, a third with a threshold of two, and so on and so forth. For simplicity, assume that the group of one hundred defines one of Beirut's districts. The first member of the neighbourhood chooses to protest independent of the doing of others, since his threshold is zero. Upon his action, the second member with a threshold of one protests, whereupon the third with a threshold of 2 will join. We can continue this chain until all one hundred members join. Threshold models apply to a large number of social phenomena, like social movements, the adoption of behaviour and fashions, and the diffusion of products and technologies. These models are flexible and allow the use of more sophisticated distributions of thresholds among group members. The blue lines in the Figure 2 a) and b) illustrate the cumulative distribution function of two normal **F2** distributed threshold levels. The graph in Figure 2 a) states that roughly 40% of the group have a threshold of zero, thus these members will choose to protest independent of others. If forty members commit, the graph tells us that approximately half of all members join, and the number will therefore increase by ten. However, the joining of all members is not an equilibrium. If all one hundred members had protested, only roughly 60% would continue to protest. The number will therefore decrease. The red 45° line in both graphs defines all states in which the number of individuals opting for the strategy corresponds to the share of members willing to take the action upon seeing them. We then observe two things in the graphs. First, the number of those who go for the action

Figure 2. The figure shows the threshold distribution for a group of size one hundred. The y-axis defines the share of members with a threshold equal or smaller to the value on the x-axis. The red graphs define the 45° line at which a value on the x-axis equals the value on the y-axis. In figure a) thresholds are represented by the blue graph and follow a normal distribution with a mean of thirty and a standard deviation of 150. Forty-two percent of all group members have a treshold of zero, 50% have a threshold of forty-five or less, whereas 60% have a treshold of one hundred, implying that forty members will never protest. The blue threshold distribution in figure b) follows a normal distribution with a mean of thirty and a standard deviation of twenty. The threshold is always lower than the corresponding share. Thus the number of protesters will increase until all one hundred group members join in. [Colour figure can be viewed at wileyonlinelibrary.com]

Colour online, B&W in print



(in this case protest) increases whenever the blue line is above the red (and decreases if it is below). Second, the equilibrium is defined at the intersection of both lines (for further details, see Granovetter 1978; for further extensions, see Granovetter and Soong 1983, 1986, 1988). Given the distribution of Figure 2 a), the number of members choosing the action increases until a share slightly below 60% and will stabilize at this point. In the case of Figure 2 b), the entire group will eventually opt for the strategy.

The problem is that Figure 2 a) and b) only give a macro perspective, and small changes in the distribution at the micro-level can lead to different outcomes than predicted from the two graphs. Let us return back to the former example of the uniform distribution, but now imagine that we remove one single individual from the group, say the one with a threshold of twenty. All individuals until and including the one with a threshold of nineteen will protest, bringing the total of protesters to twenty. Yet, the next in line has a threshold of twenty-one (as we removed the individual with threshold twenty), who will not join, therefore breaking the sequence. Under the assumption of a completely random distribution, increasing the group size implies a higher likelihood that all individuals take all the values in the distribution. What does this imply for smaller groups? Figure 3 shows the result of a simulation of two different group sizes (one **F3** hundred and ten thousand) corresponding to the distribution in Figure 2 a). At the beginning of each simulation, the computer randomly assigns an individual threshold to each group member according to the normal distribution and then checks at which point the number of members having chosen to protest ceases to change and an equilibrium is reached. Figure 3 shows the results after the simulation has been repeated twenty thousand times. The histogram indicates how frequently a certain share of members chose to protest. According to

Figure 3. Histogram of share of protesters given a normal distribution with a mean of thirty and a standard deviation of 150 after twenty thousand repetitions. The group of size ten thousand is indicated in blue, and the group of one hundred in orange. [Colour figure can be viewed at wileyonlinelibrary.com]

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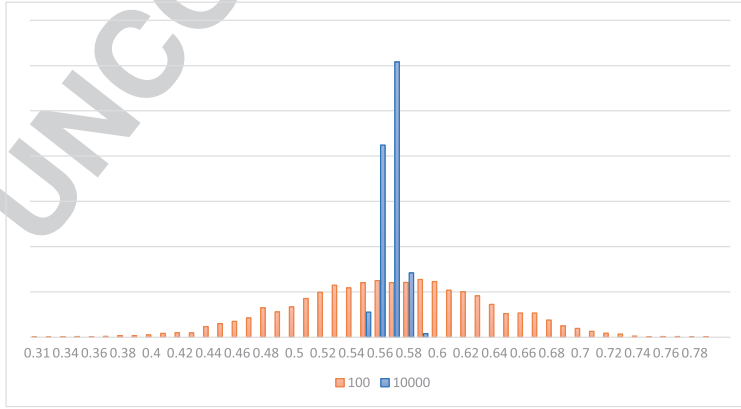

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Figure 4. Histogram of share of protesters given a normal distribution with a mean of thirty and a standard deviation twenty after twenty thousand repetitions. The group of size ten thousand is indicated in blue, and the group of one hundred in orange. The scale is logarithmic. [Colour figure can be viewed at wileyonlinelibrary.com]

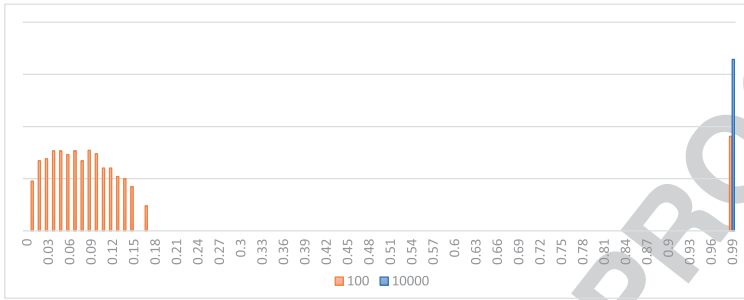

Figure 2 a) the equilibrium should occur at around 58% protesting. This is indeed the most frequent state for both groups. Yet in the large group, this state and the adjacent states occur virtually all of the time, whereas any state between 31% and 78% occurs in the small group, although the frequency of a state decreases with its distance to the 58% state. We observe that the distribution becomes broader as the group size decreases.

In a more complex social network (such as the one in Figure 1), we can assume that identity groups in one community are linked to groups of the same identity but belonging to other communities. A group that unanimously chooses an action sends a signal to another community. Members of other groups might disregard what has been chosen in their own group and follow the external signal, thereby encouraging others in their own group. This fits the context of social movements in general, and the case of the garbage protest in particular. Since demonstrations swiftly took the shape of political protests, movements spread amongst those groups against the Lebanese political establishment.

The model tells us that in large and relatively unsegregated population, we will only observe 58% of protesters in all groups, but never more. If the population is split into smaller communities, some of them will reach higher levels of protesters. This creates a spill-over effect on other groups, and more members of other groups will also choose to revolt. Thus, a segregation into smaller identity groups can support the adoption of a strategy, in this case a protest. However, this, as we will see, depends on the reactivity of identity groups to each other.

If little positive informational or motivational spill-over exists between groups (i.e. if links between groups are loose or even bear a negative weight), identity-based segregation can severely harm the adoption of an action. Based on twenty thousand runs, Figure 3 illustrates the results for both groups given the distribution in Figure 2 b). As expected, all members of the large group choose to protest in all runs. (Note that the scale is logarithmic – i.e. the blue column on the right is actually thirty times higher than the orange column.) The small

group, however, gets frequently stuck at a low equilibrium and all members protest in only 16% of all runs. The above model illustrates in which way a *divide et impera* strategy minimizes the probability of widespread social movements and supports the negative correlation between collective actions and preferential within-group heterogeneity.[8] In fact, the consolidation of elite power has been a central motivation behind the inauguration and perpetuation of the sectarian system of Lebanon, as illustrated in Makdisi (2000), Kingston (2013), and Salloukh et al. (2015).

Co-evolution of Institutions, Preferences, and Ideals

If we abstract from situations, in which an individual is born into an identity group and is forced to remain, the decision of becoming a member is no one-time decision but is constantly reassessed and must be considered in a dynamic context. Affiliating oneself to a group changes the composition of the group and hence its ideals, norms, rituals, and interaction structure. New members can introduce new characteristics or may place higher importance on characteristics that have played only a secondary role for those composing the group prior. Some senior members will reconsider their affiliation and leave the group. As a consequence, those characteristic which define the group's ideal or model will change and attract new members. Although the individual impact is negligibly small in sizable groups, the group's institutional framework can drastically change over time. This requires an analysis of identity formation in the form of 'games' in networks, which study the resilience of endogenously changing network topologies to endogenous change and, in parallel, the decisions made by members. Although spatial game theory is still in its fledgling stage, a number of models have analysed the dynamics and strategic choices of agents when interacting in local public good games with positive externalities (see, e.g., Ballester et al. 2006; Bramoullé and Kranton 2007; Galeotti et al. 2010 Goyal and Moraga-González 2001). However, closed-form solutions have been obtained if either the network topology was set to a simple form or when the analysis was reduced to link formation.[9] Agent-based modelling allows for simulating the complex adaptive system of identity groups by taking into account the interrelation between strategic choices and topological evolution of the network. Bereft of the beauty of a close-formed solution, simulations require either a reasonable empirical foundation or results robust to parameter changes.[10]

In the following, I will illustrate a simple agent-based model that reduces the co-evolution problem by looking only at the impact of individual decisions on social group identity. Assume that each individual is characterized by a set of criteria that are randomly determined for each individual and jointly define his identity. A criterion can be a character trait or attribute of a member, or illustrate a view or conviction. For each criterion, an individual can have a value between zero and one, where both values define an extreme position of the individual with regard to the criterion. An extreme left or right political view is then defined by a values of zero or one, and a value of 0.5 describes a moderate position, such as being absolutely in favour or against migrants or having an ambiguous view.

Similarly, a value of zero and one can correspond to a black or white skin colour. Each individual compares his/her set of criteria to a set defining the group's social identity. For simplicity, this social identity is simply the average value of each criterion over all members.[11] In each period, an individual therefore observes the social identities of all groups, and chooses the group that is closest to his identity by summing the distance between individual and group criterion over all criteria.[12] Somebody with conservative views joins a more conservative group, whereas a liberal person joins an equivalent group. The group might not perfectly fit an individual's profile, but constitutes the group in which the least concessions have to be made. Yet, by associating oneself to a group, the group's social identity changes. In the next period, members will reassess their choice. If another group is closer to an individual's identity, he switches to the other group. Figures 5 and 6 **F5 F6** illustrate simulation results of the simplified model. The assumption that individuals change affiliation in each period may sound overly strong; however, equilibrium results are unaffected if the share of individuals considering to switch is reduced from 100% per period to much smaller single-digit values. Similarly, although both simulations were initiated with equal group sizes, results seem to be unaffected if simulations are initialized with a dominant group (e.g. the simulation is initialized with 80% of the population being reds). On the other hand, the dynamics and long-run equilibria are not robust to variations in the distribution of individual criteria. The share of *extremists* crucially affects final results.

Figure 5 shows a simulation in which ~~30%~~ of all individuals have an identity defined by a set of extreme criteria values – i.e. each criterion has either value zero or one, and the rest have an identity following a standardized uniform distribution.

Figure 5. Simulation with two thousand individuals, four groups, and fifty criteria. Share of extremists: 31%. [Colour figure can be viewed at wileyonlinelibrary.com]

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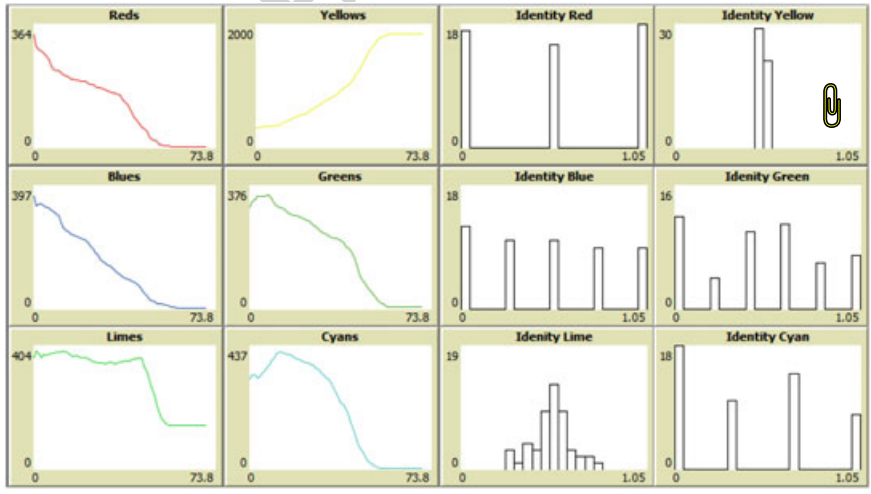

Figure 6. Simulation with two thousand individuals, four groups, and fifty criteria. Share of extremists: ~~31%~~. [Colour figure can be viewed at wileyonlinelibrary.com]

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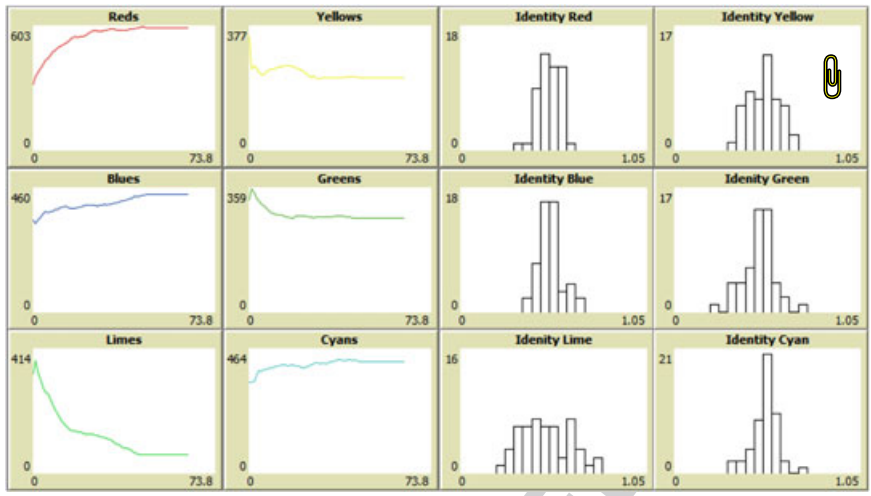

The left two columns in the graph indicate the evolution of each group size. The coloured lines trace the group size over ~~seventy-three~~ periods starting at a value of roughly 333 members (given a total population of two thousand and six groups). The right two columns illustrate the histogram of the values for all fifty criteria in period ~~seventy-three~~ for each group. The histogram illustrates the frequency of a given value in the group's social identity, given a bin size of 0.05.[13] We observe that most individuals became members of group yellow. The corresponding histogram states that roughly thirty criteria have a value between 0.45 and 0.50, and the remaining twenty criteria have a value between 0.50 and 0.55. Thus, the group is very moderate. The red group, on the other hand attracted a small number of extremists. The histogram shows that roughly one-third of all criteria have a value at 0.5, whereas the remaining criteria have either a value of zero or one. We further observe that also group blue, green, and cyan have extremist tendencies for some criteria, whereas lime is an average sized group where the ideal follows the hump-shaped normal distribution (i.e. most criteria have a value of 0.5).

Figure 6 illustrates a simulation with an initial share of 29% extremists. Although the degree of extremism only changed by 2%, results differ fundamentally after seventy periods. Apart from the smallest group, lime, the histograms follow the hump-shaped normal distribution and are concentrated at balanced values around 0.5. No group illustrates extremist opinions, and most groups are of comparable size. However, if we rerun this simulation a number of times at 29%, we observe that in some repetitions, extremist groups evolve as in Figure 5. Thus although the model is greatly reduced in complexity, it already illustrates a few intricate results. Group identity can turn into extremism

by chance events or can be strongly affected by small changes in the opinions of agents. More sophisticated and realistic models can better describe the dynamics, but require more extensive simulations to understand evolving properties.

Lessons from Behavioural Economics

Another shortcoming in current literature is the limited application of behavioural economics. Although research has not been directly applied to the context of identity, the knowledge of individual motivations and biases which we obtained in recent years in behavioural economics can greatly promote our general understanding of the interdependence between identity formation and group affiliation. In the following, I will elaborate in which way behavioural research directly applies to the impact identity on decision-making.

Becoming or being born into a specific identity group does not only fundamentally shape and reshape an individual's preferences. In addition to social pressure, which coerces an individual to carry out a less preferred or even undesirable action, being exposed to other members for an extended time, while being subjected to social learning, can lead to systemic biases and a reinforced internalization of identity-driven norms and codices (for an example, see Bénabou and Tirole 2011). As these biases grow more persistent over time, individuals find themselves in a preferential deadlock.

Behavioural economics studies deviations from the standard neo-classical approach in economic theory. The context, in which an action takes place and prior experience or information is received, primes individuals to behave in a specific manner (for examples, see Kahneman 2011). Such primed behaviour can cause further priming. In the context of identity, belonging to an identity group encourages individuals to show a certain demeanour without the additional need for external pressure (such as race and ethnicity related performance as illustrated in Hoff and Pandey 2004; Steele and Aronson 1995). This effect is closely related to the way in which individuals evaluate their own abilities and morals (e.g. overconfidence of CEOs about their ability to manage a company, see Malmendier and Tate 2005), and stretches the concept of fairness beyond the individual level. As a consequence, an individual's expectation of a fair share does not only depend on his own past interactions and social standing as illustrated by Binmore: 'A person's social standing, as measured by the role assigned to him in the social contract currently serving a society's status quo, is therefore highly relevant to how his worthiness is assessed by those around him' (Binmore 1998:459). It extends to the identity group level.[14] Priming (especially in the form of anchoring), as well as its impact on one's personal evaluation in the form of overconfidence or modesty defines the actions taken in bargaining decisions at the socio-economic and political level. In return, this bias is aggravated by reference-dependent preferences, especially in the form of endowment effects (for an economic application, see Kahneman et al. 1990). Individuals evaluate benefits and losses not in absolute terms but relative to their status quo or to a given reference point. In this way, an individual also assesses obtaining a right or a monetary payment based on whether or not it was obtained in a previous interaction.

Consequently, identity groups will have a different definition of a fair share. Economic models of priming and reference-dependent preferences can therefore provide an additional explanation for the perseverance of regimes that economically and politically disadvantage some ethnicities and favour others (e.g. apartheid, the caste system in India, or the sectarian system in Lebanon).

Reference-dependent preferences also explain how belongingness to an identity affects individual interpretation and evaluation of new information in the form of framing effects. The frame in which a new situation presents itself to an individual and therefore its assessment is defined by the individual's identity and peers. Consequently, the normative framework in which identity group members interact, and the incorporation of extraneous but identity-specific details, define whether new choices are framed positively or negatively. This framing effect is reinforced by confirmation bias – i.e. an individual trusts more new information if it is compatible with beliefs and confirms prior expectations. As these expectations and beliefs are shaped mainly by peers, an individual is more likely to refute information that contradicts the normative code of his identity group. In addition, individual choices are affected by preferences for the familiar (for an economic application, see Huberman 2001). When given the choice between a number of options, an individual will prefer to take an action with which he is already acquainted, even if this implies substantial costs caused by forgoing another option. We observe that the collection of biases are mutually reinforcing and have strong repercussions in the context of identity groups. Individuals are less likely to choose actions beyond those prescribed by their identity group. Even if they are willing to try alternatives or are exposed to new contradictory information by chance, members will place little importance on this information. Consequently, once a member is sufficiently rooted in the group's belief system, he is unlikely to question its normative framework. This normative frame will define his actions and future experience while further reinforcing an identity-enforced conditioning and limiting individual decision-making.

Only sophisticated analytical models can take account of these co-evolutions of individual and group preferences on the one hand, and institutions (defining the norms and topology of interaction) on the other hand. The study of the dynamics behind identity formation is thereby further exacerbate by the multi-dimensionality of selection and adaptation mechanisms. This multi-dimensionality occurs along two line. First, individual decisions affect the wellbeing of both members and a group as a whole. Thus, socio-economic and political liberties and power simultaneously evolve both at an individual and at an aggregated level. The social dynamics of identity groups are therefore subjected to selection forces, which operate within and between groups. A number of models (e.g. Axtell et al. 2001; Boyd and Richerson 1988, 1990) study the underlying dynamics and equilibria of social systems subjected to multi-level selection and illustrate interesting evolving properties and complexities. However, to my knowledge, multi-level selection has not yet found its way into identity economics.

The multi-dimensionality further extends to the criteria that motivate an individual to become a member of a group. As mentioned above, literature based on the model by Akerlof and Kranton (2002) assumes that individuals are defined

by a fixed set of characteristics and are faced with the problem to match an ideal as defined by the identity group. In these models, the decision of whether to associate oneself with an identity group is usually simplified by considering a particular characteristic. Alternatively, the set of individual characteristics is condensed to a mono-dimensional measure by taking the (probably weighted) Euclidian distance between the individual's and the ideal's set of characteristics (as has been done in the previous model). An individual then chooses a group that minimizes this distance. In light of the literature criticizing the reduction of multi-dimensional preferences to one-dimensional utilities, as well as the studies on intersectionality, it is unclear whether the Euclidian distance is a viable simplification to explain individual association with a specific group. The problem is further aggravated by the existence of multiple social identities as raised by Sen (2002) – i.e. that an individual's social identity is endogenous to his choice and action. Online media, for example, provide individuals with opportunities to choose a new identity independent of social and biological constraints, while disguising one's inherited identity. In addition, these multiple social identities may not necessarily overlap, can create internal and external conflicts, and may lead to self-deception (for a model on the latter, refer to Young 2008).

Conclusion

Without a proper account of identity, economic models neglect a strong social motivator of individual decision-making and fail to explain a number of socio-economic phenomena. We have seen that the formation of identity and identity groups is characterized by complex systems driven by the co-evolution of individual preferences, group characteristics, and institutions. This leads to evolving properties, which cannot be understood by analysing identity formation ~~neither~~, at an atomistic micro-level ~~nor~~, aggregated macro-level. Although identity has found its way only fairly recently into economics, adequate analytical tools in economics can help model and study these complexities. In addition, behavioural economics takes on a supporting role. Although recent findings do in principle not directly focus on the context of identity, behavioural economics has provided results that prove insightful for our understanding of the complex interdependencies between identity and group formation. In this regard, identity economics does not only benefit from prior research in other social sciences, but is able to provide sophisticated approaches that support transdisciplinary research on this topic.

Notes

[1] In economic terms, the marginal cost of production/provision is zero.

[2] This public good problem of identity groups illustrates similar issues to what we find in the 'greed' versus 'grievance' debate in the literature on collective actions (for an overview, see Hoeffler 2011), i.e. to which degree individual decision-making is motivated by the public versus the private good nature of participating in collective actions.

[3] Sen (2006) raised a similar point by criticizing the perception of a homogenous identity group, or what he calls 'solitarist' identities. He argues that the oversimplified concept juxtaposes us and them and leads to violence.

[4] For example, the individual prefers a neighbourhood of 51% white to 49% white, or 75% white to 25% white, but not necessarily a neighbourhood of 75% white to 51% white.

[5] Formally, the probability that a new node (i.e. an individual) connects himself to another node k is defined by $p_k = l_k/(\sum_j l_j)$, where l_i defines the degree of node i (i.e. the number of individuals this node is connected to) divided by total degree over all existing nodes. Thus, if the network has three nodes i, h, and k, where the first is connected to the other two, yet h and k are not connected to each other, we have $l_i = 2$, $l_h = l_k = 1$, and the probability of some new individual to form a relationship with i, h, or k is thus $p_i = 1/2$, and $p_h = p_k = 1/4$.

[6] The graph has been simulated in NetLogo and the layout was done in Gephi. The code for all simulations discussed in this article can be obtained from the author.

[7] In this article, social learning occurs in the form of a simplified form of vicarious reinforcement. Individuals imitate the strategy of the member of their peer group (i.e. a neighbour in the network), who received the highest payoff in the last sequence of interaction.

[8] On the other hand, Esteban and Ray (2008) illustrate on the basis of a theoretical model that ethnic conflict is more likely to occur than class conflict, showing that economic heterogeneity within groups foster conflict due to a favourable division of labour.

[9] A closed-form solution solves an analytical problem in terms of a finite set of functions and mathematical operations.

[10] In this context, robustness indicates the immutability of long-run equilibria to a wide range of different parameter values.

[11] Assume a group of three members, each defined by two criteria. For member i, j, k we might assume criteria $(0.2,0.3)_i$, $(0.4,0.4)_j$, and $(0.9,0.2)_k$. The group's social identity is then (0.5,0.3).

[12] In the case of two criteria (e.g., view on 1. sexual liberty and 2. migrants), assume that the individual has the criteria $(0.3, 0.6)$ and the group identity is defined by views $(0.5, 0.5)$. The individual distance from the social identity of the group is calculated as $(0.3 - 0.5)^4 + (0.6 - 0.5)^4 = 0.0017$. The exponentiation takes into account that stronger difference weigh proportionally more than small, which are mainly neglected.

[13] Take, for example, a moderate group's social identity is defined by five criteria, say (0.3,0.4,0.6,0.3,0.5). Then the column in the histogram at value 0.3 has a height of two, at 0.4, 0.5, and 0.6 a height of one. The columns at all other values have a height of zero.

[14] This effect can be especially observed in sectarian societies. In Lebanon, for example, social rights, job opportunities, and wages are determined by sectarian affiliation.

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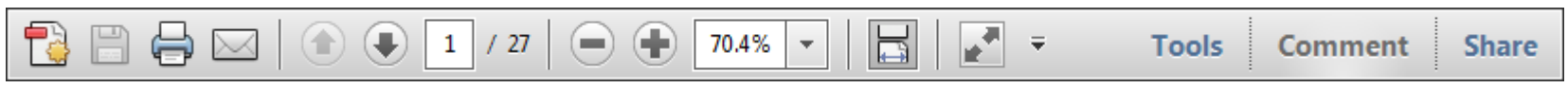

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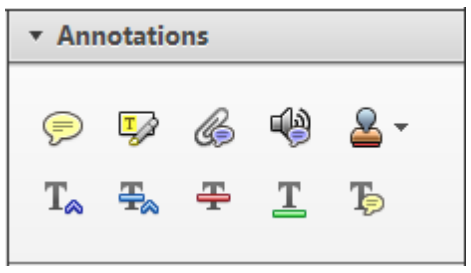

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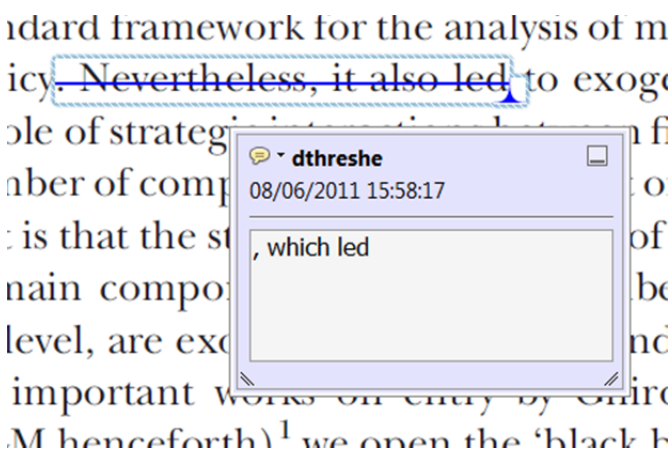

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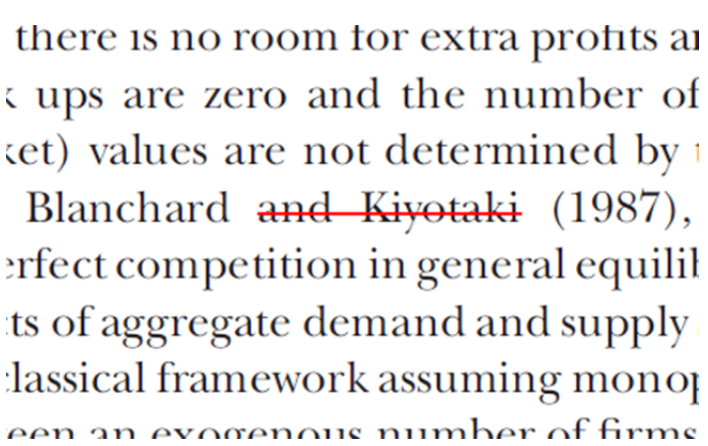

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- Highlight the relevant section of text.
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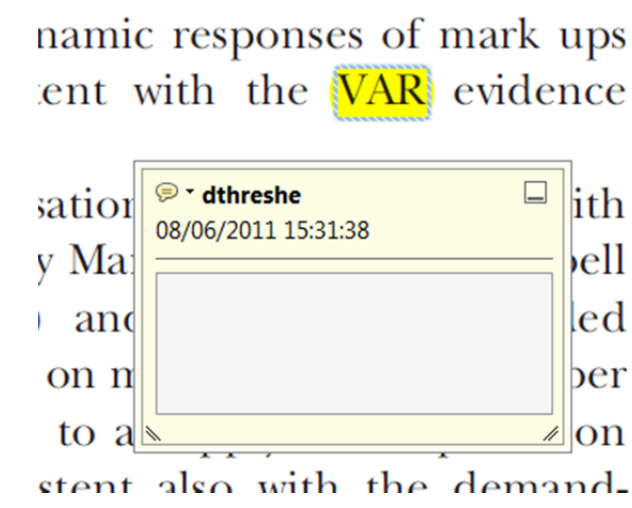

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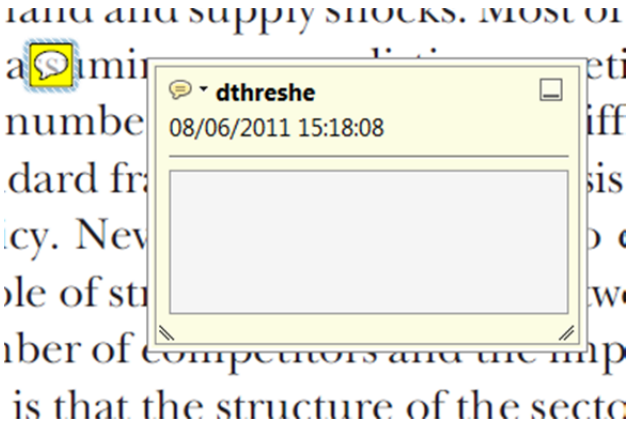

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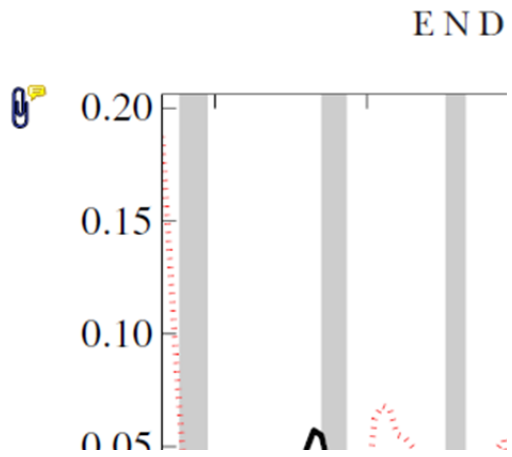

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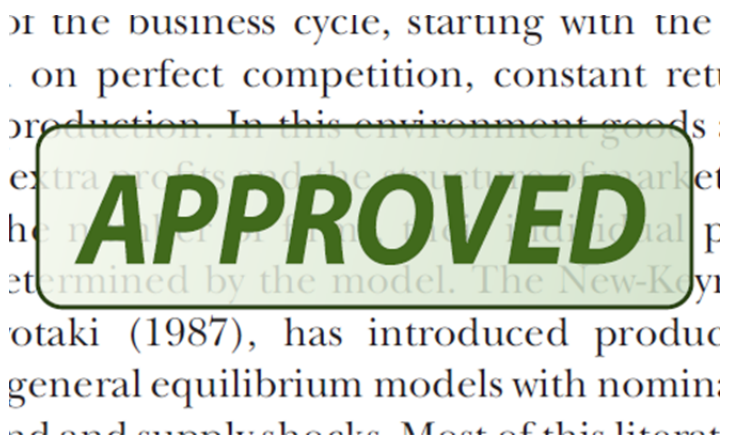

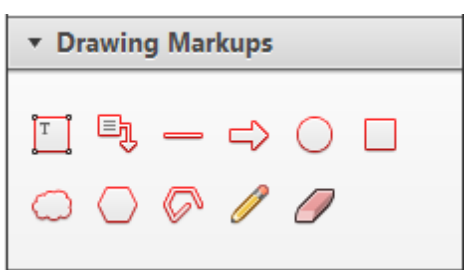

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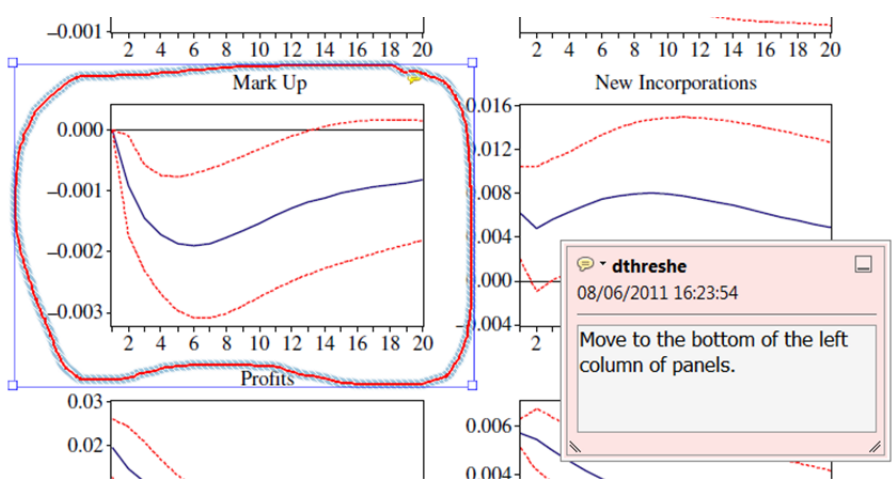
- To add a comment to the drawn shape, move the cursor over the shape until an arrowhead appears.
- Double click on the shape and type any text in the red box that appears.



For further information on how to annotate proofs, click on the Help menu to reveal a list of further options: