LEGAL ENTITY IDENTIFIERS (LEIS) AS PUBLIC GOODS AND REGULATORY MANAGEMENT OF FINANCIAL RISK

by David Rann
Abstract
This paper will examine the information failures that the Legal Entity Identifier (LEI) seeks to address, and investigate whether or not the LEI is an underprovided public good – and if so, why. LEI proponents claim significant private benefits to firms from using a standardized LEI system, but past attempts to create similar identifiers have failed to see widespread adoption by wider financial market participants, apart from the larger banks. Data on LEI adoption shows that firms typically only register when required by law (in the markets examined, the United States, Canada, and Germany/Italy/France). The claimed benefits to society of using the LEI system are significant – allowing regulators to better identify concentrations of market risk and act to prevent a market crisis – but issues with LEI implementation (such as problems with data integrity) pose a threat to the future utility of the LEI system. These problems may provide an explanation for why the expected ‘tipping point’ at which firms sign up for the LEI numbers of their own volition (due to the value of holding an LEI) has not yet been realized.

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## Acronym Glossary

CFTC – Commodity Futures Trading Commission  
CICI – CFTC Interim Compliant Identifier  
CUSIP – Committee on Uniform Securities Identification Procedures  
FCIC – Financial Crisis Inquiry Commission  
FSB – Financial Stability Board  
GLEIF – Global Legal Entity Identifier Foundation  
LEI – Legal Entity Identifier  
LEIROC – Legal Entity Identifier Regulatory Oversight Commission  
LOU – Local Operating Unit  
OFR – Office of Financial Research
I. Legal Entity Identifies and Entity Identification Problems Among Firms

Information problems associated with imperfect means of identifying parties to financial transactions have led to rising costs to firms and increased market uncertainty. These problems contributed to financial market chaos following the 2008 failure of Lehman Brothers, as market participants were unable to unambiguously determine their financial exposure in a timely manner, contributing to market uncertainty during an already uncertain time (Financial Research 2015). In response to the problems exposed by the 2008 financial crisis, politicians, regulators, and members of the financial data industry have led the push for the creation of a unique 20 character alphanumeric code called the Legal Entity Identifier (LEI) for all entities (excepting individuals) that enter into financial transactions.

The LEI has been a global movement from its birth; the G-20 endorsed the creation of one standard identifier contained in a June 2012 Financial Stability Board (FSB) report. The Legal Entity Identifier Regulatory Oversight Committee (LEIROC) was created in January of 2013 to oversee the creation of the Global LEI System, with more than 60 public authorities from 40 countries signing on to the LEIROC charter. The LEIROC, and later the Global Legal Entity Identifier Foundation (GLEIF) laid out a roadmap for the future of the LEI; LEI Level 1 carries basic LEI ‘business card’ data, such as the official company name and the company address. LEI Level 2, first rolled out in May of 2017, will carry more data on company ownership; full Level 2 data is expected to available in 2018, as firms renew and update their LEI registrations.

This paper will attempt to answer two main questions. First, what is the value of the LEI, both to firms and to society as a whole. I will examine whether an entity identification system is a public good, and if so, what conditions have resulted in its underprovision in the market. For
simplicity, this paper will examine the benefits of the LEI system using language adopted by Chan and Milne (2013) for benefits accrued to firms (‘private benefits’) and benefits accrued to society (‘social benefits’) although the distinction between the two is not always very clear (and often private benefits to firms can lead to greater social benefits, particularly if firms are able to assess their own risk exposures). I will also discuss the possibility that the LEI will benefit from significant network effects, building off of the existing network effects literature, and how regulators could theoretically coerce enough firms into moving to the LEI so that a ‘critical mass’ is reached and LEI adoption becomes universal.

The second question that the paper will answer is why firms have not been eager to register for LEIs—despite their stated large private and social benefits—outside of a regulatory mandate. Some of the problems with the implementation of the LEI will be addressed, and the effectiveness of the LEI in helping to prevent a repeat of the 2008 crisis (one of the justifications given for the creation of the LEI and regulator-mandated use of the LEI) will be examined as well. Given past failures (Financial Crisis Inquiry Commission 2011), even when data was available, it is entirely possible that regulators may not be able to effectively manage market risk, due to a combination of incentives facing the regulators and inherent limitations on regulatory mechanisms. In short, the answer to effective management of financial risk may not simply be more or better data.

The answers to these two questions can be illustrative in considering the proper course of action for policy makers beyond this specific example of creating a universal entity identifier. The transparency goals of the LEI system are laudable- but the failures of regulatory bodies during past financial crises should serve as a warning against attempting to accomplish these goals solely by regulatory mandate. If the expected ‘critical mass’ of firms using the LEI is never
reached, and firms continue to sign up only when required to by law, the full benefits of the system may not be realized. If “private benefits” to firms are eroded, the LEI has the potential to be just another regulatory burden (or a benefit only to some regulatory agencies and the largest financial data firms). Past mistakes by financial regulators, such as those outlined in the FCIC report, should encourage some humility in estimating the expected “social benefits” of the LEI system as far as improved regulatory capacity goes. If there are no benefits to firms in their ability to individual ability to assess risk, even if the LEI system does provide better data to regulators, there is no guarantee that the system will be beneficial to society.

II. Legal Entity Identifies as a Global Public Good

The Dodd-Frank Act of 2010 created the Office of Financial Research (OFR) in part to help provide regulators quality data to better assess systemic risk in the US financial system, one of several sections of Dodd-Frank intended to prevent another 2008-style crisis. When Lehman Brothers Holdings, Inc. failed, some firms were unaware of their exposures to the failed firm; over 11,000 active instruments were tied to the firm and its subsidiaries and affiliates, some with very different names from their parent (A- Team 2009). To help both regulators and market participants better assess market risk exposures, the OFR issued a policy directive, titled “Statement on Legal Entity Identification for Financial Contracts” to create a “a standardized way of identifying counterparties”—what would become the Level 1 LEI (F.R. Doc. 30018 2010). Level 2, set to roll out in 2017, seeks to further the aims of the LEI by containing more useful information, most notably information about final ownership.

The OFR’s directive included a list of requirements for the new identifier numbers. The consensus body was created as the LEIROC (Legal Entity Identifier Regulatory Oversight Committee), which is an international group of over 70 public sector authorities that have signed
on to the LEIROC charter. LEIROC is tasked with safeguarding the public interest by ensuring that all publicly available data in the Global LEI system remains easily and readily available, all entities that are either required to or willingly choose to register are easily able to do so with no artificial barriers, and all fees imposed are only for cost-recovery purposes. To promote LEI use, third parties can register an entity for an LEI; for example, financial institutions may register client firms if their clients need to execute transactions that fall under a local LEI mandate, such as swaps trading in the US. Another important role of the LEIROC is to prevent restrictions on the use of the LEI, which will be discussed in later in this paper (LEIROC n.d). An LEI acceptable for use with data reported to the Office should (Office of Financial Research 2010):

- Be based on a standard developed and maintained via an international "voluntary consensus standards body," as defined in Office of Management and Budget ("OMB") Circular No. A–119 Revised, such as the International Organization for Standardization ("ISO")
- Be unique for each legally distinct entity, where each legal entity is assigned only one LEI which cannot be reassigned
- Persist over the life of an entity regardless of corporate actions or other business or structural changes
- Include minimal information about the entity in the identifier itself
- Accommodate growth in the number of legal entities that need to be identified in the full range of reporting systems and to potential industry and regulatory innovations
- Be available for all eligible markets participants, including but not limited to all financial intermediaries, all companies that issue stock or debt listed on an exchange, all companies that trade stock or debt, infrastructure providers, all entities subject to financial regulation, and firms affiliated with such entities
- Not be contractually restricted in use
- Where possible, be compatible with existing systems, work across various platforms, and not conflict with other numbering or identification schemes
- Be readily accessible using secure and open standards
- Be reliable and secure against corruption or misuse
- Be capable of becoming the single international standard for unique identification of legal entities in the financial sector

The LEI was not the first attempt at creating a unique number to use for entity identification. Firms and regulators currently use a wide array of identifiers for entities, from Committee on
Uniform Securities Identification Procedures (CUSIP) numbers for identifying securities, to Dunn and Bradstreet numbers (used in assessing firm creditworthiness) to internal designations—which can and do sometimes vary by department within one organization. These many different identifiers used by government and private entities can lead to the ‘siloing’ of data among or within different regulators or firms, making it more difficult to match records.

Supporters of the LEI contend that a uniform identity matching system such as the LEI is a public good, by definition, that no entity can be prevented from consuming the information included in the LEI (non-excludability) and that one entity’s use of the LEI does not affect another’s ability to use the information as well (non-rivalry). From this perspective, the reason that the LEI has not already been created has been developed and seen widespread use is because of a classic problem facing the provision of public goods—underprovision. When firms do not factor societal benefits (particularly failing to account for network externalities: the more entities are registered, the more useful the LEI becomes) into the decision to produce a good, the good will be produced at a socially suboptimal level. To best determine if an LEI’s use in entity identification is indeed a public good, I will examine whether the LEI meets the above standard public good definitions of being non-rivalrous and non-excludable.

A. Non-rivalry

The LEI contains information akin to knowledge, which Joseph Stiglitz argued is a public good in his 1999 paper “Knowledge as a Global Public Good” (Stiglitz 1999). Similar to the consumption of knowledge, each additional use of the LEI system carries zero marginal cost to providers of the LEI information. Additional consumption of the LEI number by regulators or firms to collect financial data, meet compliance requirements, conduct credit checks, or determine exposure to a firm’s assets does not increase the costs incurred by another entity that
seeks to do so as well. In mainstream public goods theory, the implication follows that the LEI cannot be privately provided, as in an efficient market competition should ensure that price would be set at the marginal cost of creating another unit of information, which would be zero. At a zero price, no private company would be able to produce the LEI system, absent other benefits (or a government subsidy) and there would never be a creation of a single entity identification system.

To further the parallel with Stiglitz’s discussion of knowledge as a public good, there are costs associated with registering and maintaining an LEI registration. Fees associated with the costs incurred in the process of creating and storing the LEI registration are typically quite small for a single entity (in the neighborhood of $220 to initially register and $120 per year to maintain an LEI in the United States with the Depository Trust and Clearing Corporation (GMEI Utility). A greater barrier to universal use of the LEI lies in adapting systems to process data with the new LEI requirement. These costs are not insignificant; according to a white paper produced by Data Management Review, the first-year cost to a financial institution of registering clients and adapting their legacy systems for 5,000 LEIs is around $6.25 million, with ongoing annual maintenance of up to $3.2 million per year (A-Team 2017a). For larger financial institutions, this amount would be correspondingly greater, but at the same time large financial institutions may also see greater returns from the LEI system. It is still uncertain whether the benefits of using the LEI system outweigh the costs (Payments Market Practice Group 2017), but currently large numbers of firms are registering only when required to by law. However, despite these high fixed costs, the marginal cost for each additional use of the information carried by the LEI remains zero.
B. Non-excludability

The LEI is non-excludable by design of the LEIROC and the Global Legal Entity Identifier Foundation. The LEIROC includes protecting the non-excludable nature of the data carried by the LEI as one of its core objectives (LEIROC n.d.) and prevents any restrictions on use of the entity identification information contained in the LEI. Any individuals, firms, or regulators that wish to use the LEI for entity identification may not be prevented from doing so, and Local Operating Units (LOUs) may not charge data consumers, even to cover the costs of providing the data. Many of the most well-known LEI alternatives that firms may use for entity identification do not charge for identification purposes—anyone can look up a company on OpenCorporates in the UK or find a firm’s Dunn and Bradstreet (DUNS) number for a price of zero. The LEI regime has attempted to reinforce the non-excludable nature of an entity identification system; the information carried by entity identification systems in use before the LEI’s creation could be made exclusive by the owner of that network (requiring an account to view the requested information, etc.) This has been the case with past identifiers, such as the CUSIP and the DUNS number, with fees charged to data consumers to cover costs incurred in maintaining the system and generate revenue (LEIROC n.d.). Because (by design) no individuals or firms may be excluded from using data contained within LEI, there will be no opportunities for profit taking in the market for entity identification, as competition among firms that seek to use LEI firm-identification data should push the price to zero. An entity identification system such as the LEI is thus non-excludable, even if a general entity identification system need not be.

If it is accepted that the identification purpose of the LEI number is indeed a) generally non-rivalrous and b) non-excludable, it follows that the use of the LEI for identifying entities meets the criteria of a public good. Further, the LEI meets the stricter definition of a global
public good, with “benefits that cut across borders, generations, and populations” (Kaul et al. 1999, 452). The entity identification aspect of the LEI number meets these criteria; entity identification remains a public good, and the benefits accrue to firms that consume the good, regardless of the firm’s physical location (firms that are located in countries lacking local LOUs can still register, choosing an LOU that has cross-border services) (LEIROC n.d). The note that only the identification aspect of the LEI is a global public good is important; other proposed future uses of the LEI system that may evolve with the Level 2 LEI rollout and beyond may not do the same. Examples of other proposed future LEI uses that could be excludable based upon geographic location, including the use of the LEI system to meet local regulatory reporting requirements (such as Know Your Customer regulations in the US) or for other firm specific needs (such as assigning credit limits in the EU). These geographic restrictions would make these other future uses fail the test for being global public goods, although they could remain local public goods in their respective countries.

### III. Benefits of the Legal Entity Identifier

Before examining the effectiveness of the LEI system, it is important to define the expected benefits of its use. Chan and Milne (2013) describe two major categories of benefits from a global LEI network: a) ‘private benefits’ to firms that come from increased processing efficiency in financial markets and b) ‘social benefits’ as regulators are empowered to better monitor systemic financial risk.

#### A. Private Benefits

A key potential ‘private benefit’ to firms is the increases in processing efficiency due to a streamlining of the information firms would be required to retain to meet internal recordkeeping and operational requirements. Ideally, the LEI also could reduce the regulatory burdens by
offering a single standard to meet requirements across a wider set of regulators. Increasing the utility of the LEI for individual firms, for example by the requirement contained in the proposed Financial Transparency Act that all eight major financial regulators in the US adopt the LEI, could well increase the private benefits to firms of signing up for and using the LEI and make it easier for financial institutions to meet their reporting requirements. However, a streamlining of Know Your Customer (KYC) requirements, Anti-Money Laundering (AML) requirements, swap participant’s registrations, and various other mandatory identifiers that firms are required to retain on file is still far in the future, with the advent of LEI Level 2 and beyond. The possibility of linking the LEI to credit decisions could yield both a private and a social benefit, by enabling firms to better and more efficiently make credit decisions. If firms are empowered to make better decisions, market risk caused by firms acting on incomplete information is reduced; given the interconnected nature of modern financial markets, this reduction would be expected to benefit both the firm and the global financial market as a whole. Many challenges remain before this private benefit (a reduction in regulatory burden) of the LEI can be realized. A challenge that has been identified is in dealing with (LEI-ineligible) individuals (Payment Market Working Group 2017) which would require a separate system, possibly undermining some of the private gains from the streamlining of regulatory reporting requirements.

The private benefits to financial institutions from using the LEI system would most likely be greatest for large institutions. Historically, larger well-established financial institutions have been adept at shaping new regulations and requirements to suit them, even regulations ostensibly aimed at curbing their perceived excesses (Mahoney 2000). Multinational institutions with many subsidiaries stand to benefit significantly more from using one global uniform reporting regime than smaller local institutions. Of course, costs would be higher for large institutions than for
small ones, but even these greater costs would not prevent significant gains from more uniform reporting and standardization of data formats across countries. It has been estimated that multinational financial firms could save billions of dollars per year in compliance costs from the use of the new identifier (Couillaut et al. 2017). It is not surprising that large institutions (Securities Industry and Financial Markets Association n.d) are in favor of increased LEI adoption, while smaller institutions\(^1\) have raised concerns about the potential costs imposed by a universal LEI requirement, for example the American Banker Association (ABA 2015).

The primary use of the LEI in entity identification alone could be a tremendous benefit to firms, providing an unambiguous, infinitely repeatable means of entity identification. Past crises have shown that the lack of a standardized entity identification system leads to problems with identification that further increases uncertainty in individual firms and across the wider financial market. Chan and Milne provide several examples of companies that encountered problems determining their exposures to risk due to identification problems following the failures of Lehman in 2008, Long Term Capital Management in 1998, Enron in 2001, and MF Global in 2011 (Chan and Milne 2013). It can be difficult to identify the issuing entity of a given security by name alone. It is quite common for companies to share names, particularly with generic names. For example, there are 14 banks in the United States with the name of City National Bank, and many more with similar variants of the name (ABA 2015). A global standard identifier also could help avoid issues caused by linguistic differences, one of the motivations behind the G20’s (FSB) decision to implement the Global Legal Entity Identifier (GLEI).

The LEI’s coming Level 2 functionality is expected to help with the difficulty outside individuals or entities face in determining a given firm’s hierarchy structure. A company’s web

\(^1\) Smaller institutions represented, as well as larger institutions, by the American Bankers Association or ABA.
of subsidiaries and related entities can be complex, particularly if that company is a multinational one. The Level 2 LEI is intended to move the LEI beyond the basic information that the Level 1 LEI contained to further enhance these private benefits to firms. Level 2 LEI requires firms that renew their registration to provide ownership details, both upwards and downwards. As discussed above, this was rolled out in May 2017 and is expected to be completed in 2018. The Level 2 LEI should increase the value to firms of the LEI, although its rollout in the United States is dependent upon firms choosing to renew their registrations, which is a problem given the large numbers of lapsed registrations by firms that are not required to register in the course of their normal business.

IV. Firm Private Benefits and Network Effects of the LEI

An important part of the LEI’s private benefits comes from the expected network effects caused by increased LEI use. Based on the work of Oliver et al. (1985), the use of the LEI for entity identification fits within the model of an accelerating production function; as the LEI becomes more useful the more widely it is adopted. For public goods of this nature, a ‘critical mass’ of entities that have a combination of interest and resources great enough to overcome the coordination problem must exist for the good to be provided. Otherwise, the network will not be created. LEI proponents place the needed critical mass for the LEI to become universal at around one million active registrations, out of an eligible population of several million (A-Team 2017b); at this point, mandates should be unnecessary, as an LEI registration would be functionally required for a firm to be able to receive credit, transact with other firms, etc. If there is a positive relationship between interest in the good and resources available for production, the chances of the good being produced increases; lacking this, the provision of the good becomes far less likely (Oliver et al. 1985).
Supporters of the LEI believe that the answer to this problem lies in changing firm incentives. The critical mass of one million active registrations can be reached by changing firm interest in obtaining (and, importantly, maintaining) an LEI registration. To demonstrate, this paper employs a simplified version of the formal model of network externalities set out by Katz and Shapiro (1985).

Firms of type $r$ will have a total willingness to pay of $r + v(y^e)$ for a means of entity identification for a network size of $y^e$, with $v(y^e)$ representing the value of the network externality attached with more LEI users, and $r$ as the firm’s basic willingness to pay for the LEI number (unrelated to the increased utility due to network effects.) Accordingly, firms will select a method of entity identification to maximize the below equation for $n$ options of entity identification, $i = 1, \ldots, n$. (Katz and Shapiro 1985). If no entity identification scheme has a net benefit to firms (implying that the price of the schemes, $p_i$, exceeds firm type $r$’s total willingness to pay) then no entity identification option will be used at all.

\begin{equation}
    r + v(y^e) - p_i
\end{equation}

The homogeneity of the product (entity identification) then yields that two options ($i$ and $j$, in this example the LEI identification system and any alternative, such as internal identifiers, used by firm $r$) will both be used in the market if the below is true:

\begin{equation}
    p_i - v(y^e) = p_j - v(y^e)
\end{equation}

Given that LEI proponents contend that the LEI is the superior option, and see universal use (with widespread use increasing the value of the $v(y^e)$ term) as a desired end goal, advocates for government intervention would like to introduce another term, $g$, representing the government imposed costs on firms not joining the LEI system. These costs can be quite significant, such as banning firms from hedging their risk exposures in the swaps market—currently the case under
the Commodity Futures Trading Commission’s (CFTC) rule—or otherwise prohibiting financial
firms from participating in a given market. These costs would reduce the price faced by a firm;
the new price, $p_i$ to a firm is now:

$\text{(3)} \quad p_i = p_{i\theta} - g$

Equation (3) inserted into equations (1) and (2) yields:

$\text{(4)} \quad r + v(y_i^e) + g - p_{i\theta}$

$\text{(5)} \quad p_{i\theta} - g - v(y_i^e) = p_{j} - v(y_j^e)$

Given that $g$ could be quite large (varying by firm) this added requirement would be expected to
change the behavior of not only firms on the margin, but also of firms that do not value LEI
registration very highly. Mandatory requirements appear to have indeed changed firm behavior
as shown in Figure 1 of this paper, even though the costs of updating systems and integrating the
LEI into operations (included in $p_{i\theta}$) are quite large and tend to grow with firm size (A-Team
2017a). The net ‘price’ facing a firm of using the LEI system, $p_{i\theta} - g - v(y_i^e)$ has fallen
significantly by the addition of the $g$ term, and the benefits, $r + v(y_i^e) + g$, have risen as well. The
size of government imposed incentives to use the LEI, $g$, is indeed a question that has been
raised with regard to full LEI implementation, as the American Bankers Association noted in a
2011 comment on the OFR’s policy directive asking for clarification on punishment for non-
compliance (McTighe 2011). In the US, mandates for LEI use have been used less often than in
the EU. The reluctance of US regulators to require firms to have an LEI registration to do
business (unwillingness to impose a high value of $g$) is one possible explanation for the lower
registration numbers in the US than in the EU, where registration is more likely to be mandatory
(roughly 150,000 registrations versus 300,000 in the EU).
Another implication from this model is that as firms use the LEI more and more, and \( v(y_i^e) \) rises, \( g \) should not eventually no longer be necessary. This is the ‘critical mass’ of the good, at which point the gains from using the LEI, \( r + v(y_i^e) \), exceed the costs of doing so, \( p_i \). At this point, the government requirement is irrelevant, as the good would be supplied on its own and more firms would sign up for LEI numbers, driven entirely by the gains from using the system. Oliver et al.’s critical mass will have been reached, and the number of LEI registrations should continue to increase even if regulatory mandates are relaxed or rolled back.

However, this model assumes that a critical mass exists, i.e., that \( v(y_i^e) \) can rise to a level where the benefits to individual firms of having and using an LEI, and to financial firms of accepting and using the LEI in their transaction reporting, outweigh the costs. If a critical mass does not exist, and LEI requirements remain in place, this model predicts that firms will use LEIs even if the alternative choice would be a better use of resources, absent the government penalty, \( g \). A hypothetical example would be a situation in which firms sign up for LEI registrations to comply with mandatory regulations, but do not use their LEI registration in transactions, or shift their behavior to avoid needing to obtain an LEI. A failure to see mainstream adoption in this scenario would be the worst-case scenario for the LEI, as it would exist as just another parallel identifier. In this case, increasing \( g \) would only worsen the distortion, and even in a case of universal adoption the LEI would not be providing any net private benefits to firms.

### A. Social Benefits

Regulators’ inability to prevent the 2008 crisis has been partly blamed on a lack of quality data – an argument in support of the idea that the LEI requirement must be expanded to give regulators a clearer picture of risk concentrations within the financial marketplace. In this narrative, regulators lacked the tools to make an informed decision about whether to come to Lehman
Brothers’ rescue in 2008, as they were unaware of the catastrophic impact of letting the firm fail (in this telling the collapse of Lehman was the cause of the crisis, which may not be the case) (Taylor 2009). With better data at their disposal, regulators could have been alerted to the risk of contagion and acted differently, with the possibility that they could even have acted to prevent the crisis entirely before Lehman was a risk to the market by stepping in to stabilize firms that were in danger and posed a threat to the greater financial system (reducing systemic risk). Even outside of the Lehman explanation for the financial crisis, easier access to higher quality financial data could empower regulators to address concentrations of market risk with greater speed, important when a possible crisis looms.

Increased use of the LEI is envisioned as a way of reducing this systemic risk in the financial market. The Commodity Futures Trading Commission (2012), in its required cost-benefit analysis for a rule requiring a pre-LEI (titled the CFTC Interim Compliant Identifier or CICI) for Over The Counter (OTC) swaps, pointed to a wide range of social benefits associated with widespread use of the LEI, such as:

1) Increased transparency.
2) Improved regulatory understanding of concentrations of risk within the market.
3) More effective monitoring of risk profiles by regulators and by regulated entities themselves through the use of unique identifiers.
4) Improved regulatory oversight.
5) More robust data management systems.

The strength of the LEI is its ability to increase the amount of information that is publicly available, allowing market participants and regulators alike to better judge market risk. Increasing publicly available knowledge is generally welfare enhancing (Zingales 2004), as firms are able to improve their decisions in response to market events and avoid risky behaviors (on a large scale). These social benefits (via the private benefits accrued to firms as a result of better firm decision making) could help to justify the LEI system.
For the LEI to be an underprovided public good, the social benefits must be larger than the net costs of building and using the LEI system. If, for example, regulators are unable to use the new data effectively, the social benefits may well be lower than LEI-proponents claim, and additional data will not prevent a second 2008 crisis from occurring, unless by better firm decision making.

There is also good reason to be skeptical of any claim that the 2008 crisis was driven by a lack of data. Regulators showed an inability and or unwillingness to use data that was already available from regulatory bodies such as the SEC, and officials within regulatory agencies have admitted as much (Stein 2015). The failure of regulators to act on information that they already had received was a contributing factor in the 2008 crisis, according to the Financial Crisis Inquiry Commission Report (2011). The politically-charged report painted a picture of widespread regulatory capture as a major cause of the crisis. However, if regulators are motivated by factors other than reducing market risk, such as propping up larger financial institutions, better data will not improve outcomes. When subsidized by taxpayers, firm behavior would not be expected to be any different even in the presence of all information provided by an LEI, eroding the social benefits of the information conveyed by an LEI number.

Even if the regulatory capture problem has been resolved, the fallibility of financial regulators remains. The Financial Crisis Inquiry Commission Report (2011, xviii) also pointed to numerous other failures among the financial regulators beyond regulatory capture that contributed to the crisis:

Yet we do not accept the view that regulators lacked the power to protect the financial system. They had ample power in many arenas and they chose not to use it. To give just three examples: the Securities and Exchange Commission could have required more

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2 It is worth noting here that there was disagreement among panel members, with four of the ten members of the FCIC, Financial Crisis Inquiry Commission, panel dissenting from the report’s conclusions, along partisan lines.
capital and halted risky practices at the big investment banks. It did not. The Federal Reserve Bank of New York and other regulators could have clamped down on Citigroup’s excesses in the run-up to the crisis. They did not. Policy makers and regulators could have stopped the runaway mortgage securitization train. They did not. In case after case, regulators continued to rate the institutions they oversaw as safe and sound even in the face of mounting troubles, often downgrading them just before their collapse. (emphasis added)

The emphasized portion is concerning for how regulators will use LEI data to detect and manage concentrations of market risk. Regulatory bodies may have been inclined to rate the firms they oversaw as ‘safe’ to prevent market panic, due to the incentives facing the regulators themselves. At the same time, failure to effectively manage risk need not be for nefarious reasons – regulators can also be simply wrong, as they share the same cognitive environment as financial industry executives. Regulatory bodies can have difficulty in identifying dangerous industry developments, (what Arnold Kling terms ‘cognitive failures’) as illustrated by the banking industry’s expansion of mortgage lending while minimizing held capital reserves in the years before the crisis, with the blessing of regulators (Kling 2010). Regardless of their reasons, if the regulators made the wrong decision in 2008, it is certainly possible that they could do so again, and not make effective use of the data carried by the LEI, reducing the proposed social benefits of the system. If the overall net benefit of the LEI system is diminished in this way, the need for government intervention to solve the collective action problem facing the provision of the LEI is correspondingly reduced.

The above issues could combine to reduce the total net benefits of the LEI system. If the social benefits are less than initially claimed due to regulatory capture, cognitive failures, or other issues that prevent effective regulation, and private benefits to firms are reduced due to fragmentation, the underprovision of this global public good may not be as severe as initially it appears.
V. Issues with the Implementation of the LEI

LEI adoption, in terms of raw numbers, is quite large (see Figure 1). As of May 2017, over 500,000 LEIs have been issued around the world, primarily in the US and EU (particularly in France). Assuming that 1 million registrations is the ‘critical mass’ before universal adoption, the LEI is well on its way.

There are some reasons however not to be quite so optimistic about these LEI registrations. A large number of these registrations belong to subsidiaries and related companies of a few large firms. As of 2017, Deutsche Bank held around 3,200 LEIs and BNP Paribas held roughly 2,600 registrations (about 1.1 percent of the total number of global registrations just between these two institutions) (A-Team 2017b). As discussed earlier, larger multinational financial institutions may see greater benefits from moving to the LEI system, so it is unsurprising that many

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3 The source of the data for figures 1-5 is the Global Legal Entity Identifier Foundation, LEI Search. https://www.gleif.org/en.
registrations are for overseas subsidiaries and affiliates. Other large institutions, such as HSBC and Goldman Sachs, are similarly well represented.

The piecemeal approach to the rollout of the LEI could have unintended consequences. While the goal of almost all LEI proponents is universal adoption, a gradual rollout has been necessary in both the US and EU for practical reasons. Individual regulators have gradually put in place mandates in different areas (such as derivatives and swaps in the US). The additional barrier to participation in these markets (for example, small firms needing to obtain an LEI registration before being able to hedge their foreign exchange risk exposure) could create a market distortion away from the market clearing level, as some firms use alternate products instead of their preferred method to hedge their risk exposure. Alternately, the new equilibrium could also favor larger firms, making it more difficult for smaller firms to hedge their risk exposure (the primary reason that many firms engage in swaps).

![LEI Registration Status](image-url)

**Figure 2. LEI Status**
Figure 2 shows another issue that has come to light with the LEI’s rollout. Firms that register for LEI numbers, but then allow their registration to lapse (do not maintain the record and do not pay the renewal fee) made up 31 percent of total LEI registrations in 2017. It is unclear why these LEIs are being allowed to lapse; the percentage of lapsed registrations has stayed roughly constant since the LEI was first introduced, although it has fallen slightly in recent years. One factor that may explain some of these lapsed LEIs is that firms are permitted to register clients for LEI numbers, with permission of the entity to be registered. These registrations are handled with little input from the entity being registered, and are rarely used by the entity that has been registered. Anecdotally, the author can confirm from personal experience that this was the case in a large number of LEI registrations pursuant to the CFTC’s requirement for OTC swaps. The large number of lapsed registries also creates data quality concerns; if the information carried by the LEI is of poor quality, both the private benefits and social benefits are significantly reduced, and a new element of risk is introduced to the market (unreliable data). The value of the system would be diminished to both regulators and private companies. The GLEIF is aware of the data quality issue and accordingly has created a challenge service to provide data users “with the opportunity to substantiate doubts regarding the uniqueness of an LEI code, the referential integrity between LEI records, or the accuracy and completeness of the related reference data. It also permits pointing to possible duplicate entries or any lack of timely response to LEI related corporate actions” (Global Legal Entity Identifier Foundation accessed Feb. 10, 2019). This system allows any data users to submit challenges to LEI records on their site, but the issue with lapsed records remains a problem, given the sheer number of records (over 150,000 entries as of this writing).
VI. Why Has a Form of the LEI Not Been Adopted

If the entity-identifying function of the LEI carries such significant benefits, why has the market been unable to create a single identifier that can fill the role of the LEI? In other words, why has this public good been underprovided by the marketplace?

The regulator’s narrative for why a version of the LEI has not been successful to date can be summed up by this section from the “Frequently Asked Questions: Global Legal Entity Identifier (LEI) publication by the Department of Treasury’s Office of Financial Research:

… private sector firms and industry associations have been unable to achieve the level of coordination needed to launch a single global solution. The consistent and coordinated global commitment by members of the FSB and G-20 to act in the public interest after the worldwide financial crisis has helped overcome previous impediments to developing the LEI. (Department of Treasury 2012, 1)

In short, the OFR views the implementation of the LEI as a coordination failure that required government intervention to compel industry action, which the passage of the Dodd-Frank Act in the aftermath of 2008 provided. After the introduction of an LEI requirement for OTC swaps in 2012, current adoption of the LEI in the US has indeed been impressive – see Figure 3 for a chart showing registrations per quarter.
Figure 3. Pre-LEI/LEI Registrations by Quarter in Canada

Figure 4: Pre-LEI/LEI Registrations by Quarter in the USA
As of 2017, there were six regulations in the United States that mandate the use of an LEI number by firms, and two in Canada. More are expected in the future. Of these, the CFTC’s rule on swap data recordkeeping and reporting, (77 Fed. Reg. 2136) which was finalized in January 2012 and went into effect in August 2012 has been the most significant, affecting an estimated population of 40,000 entities in the United States, with later addenda to the rule requesting, but not requiring an LEI for other firms participating in the derivatives market (LEIROC n.d.). As Figure 4 shows, the implementation of this rule by the CFTC led to a large upturn in the number of LEI registrations by US entities, and an uptick in registrations in Canada as well (unsurprising given the large number of Canadian firms that conduct business in the United States). Similarly, Canada’s derivative reporting requirement that went into effect in October of 2014 also coincided with a large increase in firms obtaining LEI numbers.

The LEI has been more widely adopted in Europe, which has also seen a larger number of regulatory mandates for its use. The LEI, as a standardized reporting mechanism could reap even greater gains in Europe, where disparate regulatory regimes are uniting. Linguistic differences in Europe also strengthen the value of the LEI’s use in entity identification. However, even in Europe, where the LEI presumably holds a greater value to firms for these reasons, adoption also tends to follow in the wake of regulatory mandates (see Figure 4). The European Securities and Markets Authority (ESMA) is implementing a series of changes set to roll out in January 2018 to the Markets in Financial Instruments Directive (MiFID II) banning firms that fall under the regulatory jurisdiction of MiFID II from executing trades for clients that lack LEI registration. According to one data industry expert, financial firms have continued to lag in registering for new LEIs, creating a very real concern that firms will not be registered in time for the January deadline (A-Team 2017b).
Why firms have not adopted the LEI on their own is worth considering, given the tremendous amount of signaling that the LEI will be an integral part of the future US regulatory environment from US regulators (Draghi 2016), politicians (H.R. 3738 2015), data experts (Committee on Uniform Securities Identification Procedures, CUSPID 2012), and financial industry groups (Depository Trust and Clearing Company n.d.). Ivo Bieri, head of strategic business development at SIX Financial Information (a Swiss-based international financial data firm) emphasized the role of government in forcing initial adoption of the LEI, stating that:

Only companies that are obliged by some regulatory reporting duty to obtain an LEI will do so. For everyone else, it is assumed they will adopt a wait-and-see approach. Hurdles in the form of fees, the obligation to maintain the record and the required data elements—especially with regards to the ownership structure—are too significant to obtain the LEI without a clear regulatory mandate. (CUSIP 2013, 12)

A regulatory mandate does appear to have successfully increased adoption of the LEI, as shown in Figure 5 and Figure 6. Signals by politicians in support of the LEI’s future do not appear to have had anywhere near the same effect; an example is the Financial Transparency Act, a
bipartisan House bill introduced with 29 sponsors in May of 2015, that would (among other things) mandate the use of the LEI across all financial regulatory reporting regimes (with the goal of allowing easy matchings of filings from the same entity with multiple regulators and preventing intra-agency data siloing problems that were discussed earlier in this paper). While the bill has stalled, and has been reintroduced to the House and referred to committee most recently in March 2017, the passage of the Act would presumably greatly increase the value of the LEI system. As shown on the graph of LEI registrations in Figure 5, LEI registrations did not increase significantly following this bill’s introduction. The wait-and-see approach seems to have won out, although another interpretation could be that potential LEI consumers were well aware that the bill was unlikely to make it through Congress.

There are three possible reasons for the lack of positive response to these signals. First, it is entirely possible that all firms that would see any gains from applying for an LEI (particularly large multinational financial firms) did so early on in the process, from Q3 2012 to Q1 2014, when many firms in the US were required to obtain an LEI (due to the CFTC’s rule) did so. Second, it is possible that firms do not view the signal from Congress or regulators as credible and do not believe that this commitment to the LEI is genuine, given the failure of past entity identification numbering schemes to move into the mainstream. Relatedly, other options for entity identification such as ENS (Entity Naming System) proposed by Bouquet, Maña, Niederee, and Stoermer (2008) and currently available on the EU-funded OKKAM website, could possibly pose a threat to the emergence of the LEI as a universal indicator (the OKKAM Entity Name System Resolver also includes greater detail about entities, and also allows individuals to register, in contrast to the LEI). EU support for the system could serve to undermine firm confidence that the LEI is the sole identifier of the future. Third, it could be that
the costs of switching to the LEI system are high enough to prevent firms from changing over without a legal requirement to do so. Obtaining LEIs, using LEI numbers for entities that firms transact with, and meeting the data storage requirements to comply with the LEI standard could present significant barriers to widespread adoption, particularly for smaller financial firms that would not see the massive benefits that a multinational would from a global standardization of regulatory filings. If the last reason is indeed the case, as LEI proponents in favor of a universal mandate for LEI registration contend, then a central actor could indeed be required to overcome inertia and push firms into acceptance of the LEI, and doing so would be net welfare enhancing.

VII. Conclusion

If implemented according to the roadmap laid out by LEI proponents, and avoiding the possible pitfalls discussed throughout in this paper, the LEI has the potential to be a global public good, increasing transparency and reducing risk throughout the financial system. However, there are several causes for concern, particularly around the implementation phase of the LEI that could undermine the public good status of the LEI system. The reluctance of firms to start using the LEI without a regulatory mandate shows that expected private costs currently outweigh the expected private benefits of using the system, even with widespread signaling of a future LEI requirement by regulators, politicians, and industry groups. Frequent claims of massive gains to firms from the use of data standardization procedures, including the use of the LEI have been less effective at changing firm behavior than mandatory requirements (Data Coalition 2015). It is also possible that firms are hesitant to commit to the expensive process of using the LEI due to uncertainty about the commitment of regulators to the LEI (a possibility given the abandonment of past identifier schemes and widespread availability of alternatives). A third possibility, that firms are irrationally choosing not to opt into the LEI, violates market efficiency; if a firm could
reap benefits from defecting from the current system, it would be expected that some (and eventually all) would do so and the critical mass necessary to reach full adoption would be met.

The LEI has the rare potential to be a pure global public good, benefiting from significant network effects as the system matures. Changing the decision calculation faced by individual firms by means of government intervention could be accomplished by ‘hard’ government action such as the CFTC requirement for all swap participants to obtain an LEI, or by ‘soft’ action such as requiring all financial regulators to use the LEI, and expanding the possible savings to firms by allowing them to standardize their required compliance procedures. The use of ‘soft’ persuasion has two benefits over ‘hard’ government action. First, firms choosing to switch to the LEI system for reasons of self-interest would show that the claimed benefits of the system are indeed being realized. Second, the ‘soft’ method would also not be accompanied by the market distortions present in a regulator mandated use of the LEI. The benefits to firms that use the LEI system would increase with each additional member, regardless of the reason for that firm joining; in this way, firms that are already using the LEI have incentive to push for future LEI improvements, such as cleaning up of LEI records and the inclusion of more information (with Level 2 and beyond). It is of vital importance that worldwide regulators (and the LEIROC/GLEIF) ensure that the LEI is implemented in such a way that the promised gains of greater transparency and improved risk assessment in the financial system are realized. An effective LEI implementation will promote benefits to firms to an extent that regulatory (the ‘hard’ approach) is not needed. Understanding the complexity of our financial system and the difficulties facing even the best-intentioned regulators leads to the conclusion that the true ‘social benefits’ of the LEI system are those coming from improved awareness of risk among market participants, and not solely from improved data for regulators.
References


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