

Blockchain’s Big Hurdle

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Blockchain technology can maintain accurate chains of title to securities and other legal instruments in a reliable electronic form. As private industries begin to recognize the cost-saving and risk-reducing potential of this technology, state legislatures are responding.

Arizona’s H.B. 2417 *1Open this footnote Close this footnote 1 H.B. 2417, 53d Leg., 1st Reg. Sess. (Ariz. 2017).* ...*Open this footnote Close* is a prototypical state solution. In essence, the law requires parties to treat blockchain-secured records, signatures, and smart contract terms as “electronic signatures” under Arizona’s version of the Uniform Electronic Transactions Act (UETA), *2Open this footnote Close this footnote 2 Ariz. Rev. Stat. Ann. tit. 44, ch. 26 (2017).* ...*Open this footnote Close* which prohibits parties from denying electronic signatures legal effect because of their electronic form. *3Open this footnote Close this footnote 3 Id.*; see also *Unif. Elec. Transactions Act (Nat’l Conference of Comm’rs on Unif. State Laws 1999) [hereinafter UETA]*. ...*Open this footnote Close* This important categorization lends the infant technology legal legitimacy and invites world-changing innovation.

But while the promise of the Arizona law is undeniable, its constitutional validity is precarious. By amending its version of the UETA to define blockchain-based records as “electronic signatures,” Arizona placed its law within the crosshairs of the federal Electronic Signatures in Global and National Commerce Act (ESIGN), *4Open this footnote Close this footnote 4 Pub. L. No. 106-229, 114 Stat. 464 (codified as amended at 15 U.S.C. §§ 7001-7006, 7021, 7031 (2016))*. ...*Open this footnote Close* which preempts certain state departures from the original version of the UETA while enshrining much of the UETA at the federal level. *5Open this footnote Close this footnote 5 Id.* ...*Open this footnote Close* As this Essay shows, whether Arizona’s law is in fact preempted is a very difficult question. It is also an important one, for if Arizona’s law can avoid federal preemption, other states can confidently follow its lead. This Essay offers an early opinion on this matter and ultimately urges Congress to fill the gaps in ESIGN that have been exposed by the unforeseeable invention of blockchain.

I. A Primer on Blockchain Technology

A. General Background

In simple terms, a blockchain is a distributed ledger—that is, “a list of transactions that is shared among a number of computers, rather than being stored on a central server.” *6Open this footnote Close this footnote 6 Anthony Lewis, A Gentle Introduction to Blockchain Technology 4, https://perma.cc/H3AX-XJXX (https://perma.cc/H3AX-XJXX) (archived Oct. 27, 2017).* ...*Open this footnote Close* Blockchain technology was originally developed in conjunction with the virtual currency Bitcoin. *7Open this footnote Close this footnote 7 See Blockchains: The Great Chain of Being Sure About Things, Economist (Oct. 31, 2015), https://perma.cc/P6NL-Q83P (https://perma.cc/P6NL-Q83P).* ...*Open this footnote Close* In the Bitcoin context, blockchain “replaces [the] trusted third party” that would otherwise be needed to ensure that a transferor’s title to virtual Bitcoin is valid—that is, to ensure that the Bitcoin has not been illegally replicated or stolen. *8Open this footnote Close this footnote 8 Id.* ...*Open this footnote Close* In Bitcoin transactions, blockchain functions as “[a] database that contains the payment history of every bitcoin in circulation” and “provides proof of who owns what at any given juncture.” *9Open this footnote Close this footnote 9 Id.* ...*Open this footnote Close*

The strength and security of the blockchain database is guaranteed by an elaborate “consensus mechanism” by which various computers in the system must agree to update the blockchain after any legitimate Bitcoin transfer. *10Open this footnote Close this footnote 10 For a complete description of this process, see generally Lewis, supra note 6.* ...*Open this footnote Close* Through blockchain’s “mixture of mathematical subtlety and computational brute force,” computers on a peer-to-peer network alert one another to shoddy transactions and respond to legitimate transactions by updating the blockchain permanently. *11Open this footnote Close this footnote 11 Blockchains, supra note 7.* ...*Open this footnote Close* Because legitimate transactions are irreversibly recorded, illegitimate transactions can be spotted and rooted out. *12Open this footnote Close this footnote 12 For example, blockchain could prevent a party from passing off another party’s security as its own. If Party A attempts to sell a security it does not rightfully own to Party B, Party B can save itself the hassle of acquiring illegitimate title to the security by looking at the blockchain associated with the security and discovering that Party A is not the security’s true owner. See id. While parties have performed this type of due diligence in high-value transactions for centuries, doing so has not typically been feasible in the much wider world of securities and financial instruments. Id. Blockchain makes this verification process reliable and cost-effective, and its successful application in the Bitcoin context has shown its ability to succeed on a massive global scale. Id.* ...*Open this footnote Close*

B. Blockchain’s Practical Applications

1. Enhancing Reliability & Authenticity in Financial Transactions

Blockchain’s primary value lies in its potential to record and secure an immense volume of trades and financial transactions on a perpetual basis. *13Open this footnote Close this footnote 13 See, e.g., James Condos et al., Blockchain Technology: Opportunities and Risks 19 (2016), https://perma.cc/9TKH-V4KN (https://perma.cc/9TKH-V4KN) (observing that blockchain “provides a reliable way of confirming the party submitting a record to the blockchain, the time and date of its submission, and the contents of the record at the time of submission, eliminating the need for third-party intermediaries in certain situations”).* ...*Open this footnote Close* While “costly middle men” have policed such transactions in the past, blockchain empowers the network of traders to perform this function itself. *14Open this footnote Close this footnote 14 Oscar Williams-Grut, Goldman Sachs: 5 Practical Uses for Blockchain—From Airbnb to Stock Markets, Bus. Insider (May 28, 2016, 3:22 AM), https://perma.cc/B7ZY-Y36X (https://perma.cc/B7ZY-Y36X).* ...*Open this footnote Close* As Goldman Sachs has noted:

Despite the relatively low transaction costs for securities such as equities, up to 10% of trades are subject to various errors, leading to manual intervention and extending the time required to settle trades.
By applying blockchain to the clearing and settlement of cash securities—specifically, equities, repo, and leveraged loans—we estimate the industry could save \$11-\$12 billion in fees, OpEx, and capital charges globally by moving to a shorter, and potentially customized, settlement window. . . . [B]lockchain could also potentially eliminate significant additional costs across FX, commodities, and OTC derivatives. *15Open this footnote Close this footnote 15 Id.* ...*Open this footnote Close*

The Federal Reserve explored blockchain’s potential applications in a thorough 2016 report and concluded, unsurprisingly, that blockchain “has the potential to . . . drive change to the financial market structure” while acknowledging that “the industry’s understanding and application of this technology is still in its infancy.” *16Open this footnote Close this footnote 16 David Mills et al., Distributed Ledger Technology in Payments, Clearing, and Settlement 34 (Fed. Reserve Bd. Fin. & Econ. Discussion Series, Working Paper No. 95, 2016), https://perma.cc/UUU6-R2SY (https://perma.cc/UUU6-R2SY).* ...*Open this footnote Close*

This potential lies principally in blockchain’s ability to record changes to a security’s true owner in a very short period of time. Under the present system, “nearly all publicly traded equities and a majority of bonds are owned by” the Depository Trust Company (DTC), a “depository that holds securities for some 600 broker-dealers and banks.” *17Open this footnote Close this footnote 17 Brian Patrick Eha, You Don’t Really Own Your Securities; Can Blockchains Fix That?, Am. Banker (July 27, 2016, 3:29 PM EDT), https://perma.cc KBX2-2TPB (https://perma.cc KBX2-2TPB).* ...*Open this footnote Close* When buyers and sellers make a trade, they essentially swap IOUs against the true owner of the security, which does not change. *18Open this footnote Close this footnote 18 See id.* ...*Open this footnote Close* Discrepancies are therefore unavoidable, as such “attenuation of property rights [makes] it impossible to keep perfect track of who owns what.” *19Open this footnote Close this footnote 19 Id.* ...*Open this footnote Close* The risk and inefficiency produced by this

system is magnified in the present mode of “settlement,” which forces securities to “travel through the balance sheets of multiple intermediaries” during the three-day period required for securities transactions to settle. This time period can create disasters, 20*Open this footnote Close this footnote 20* *Id.* (observing as a disaster scenario the possibility that if an intermediary “goes bust—as Lehman Brothers did, as MF Global did—somebody who thought he was buying 1,000 shares of Apple, say, instead winds up being a creditor of a bankrupt firm”). ...*Open this footnote Close* and these problems are directly responsible for many of the costs and fees that accompany financial transactions. 21*Open this footnote Close this footnote 21* See *supra* notes 13-14 and accompanying text. ...*Open this footnote Close*

2. Other Practical Applications

Commentators have observed blockchain’s potential to make a positive impact in a variety of other areas as well—including providing financial services to the global poor, 22*Open this footnote Close this footnote 22* See, e.g., Elizabeth Woyke, *How Blockchain Can Bring Financial Services to the Poor*, MIT Tech. Rev. (Apr. 18, 2017), <https://perma.cc/FBQ3-TJDZ> (<https://perma.cc/FBQ3-TJDZ>). ...*Open this footnote Close* enhancing disruptive peer-to-peer services such as Airbnb, 23*Open this footnote Close this footnote 23* See Williams-Grut, *supra* note 14. ...*Open this footnote Close* fighting money laundering, 24*Open this footnote Close this footnote 24* *Id.* ...*Open this footnote Close* facilitating peer-to-peer transfers of electricity, 25*Open this footnote Close this footnote 25* *Id.* ...*Open this footnote Close* and strengthening title to property while curbing the administrative costs of doing so. 26*Open this footnote Close this footnote 26* *Id.* ...*Open this footnote Close*

C. Legislative Developments

As blockchain has taken the private sector by storm, 27*Open this footnote Close this footnote 27* See, e.g., Joe McKendrick, *Enterprises Have Extremely High Hopes for Blockchain Technology*, *Forbes* (May 22, 2017, 12:56 PM), <https://perma.cc/47PK-NC7D> (<https://perma.cc/47PK-NC7D>) (reporting that among 3,000 surveyed executives, 33% are “actively engaged” in or “considering” using blockchain, while 78% are investing in blockchain). ...*Open this footnote Close* it has also earned the attention of several state legislatures. Arizona, Nevada, and Vermont have led the way in embracing blockchain. In March 2017, legislators amended Arizona’s Electronic Transactions Act (the AETA) to clarify that “electronic records, electronic signatures, and smart contract terms secured through blockchain technology and governed under UCC Articles 2, 2A and 7 will be considered to be in an electronic form and to be an electronic signature under AETA.” 28*Open this footnote Close this footnote 28* Jeffrey Neuburger, *Arizona Passes Groundbreaking Blockchain and Smart Contract Law—State Blockchain Laws on the Rise*, *Proskauer: New Media & Tech. L. Blog* (Apr. 20, 2017), <https://perma.cc/FHR8-JTD2> (<https://perma.cc/FHR8-JTD2>); see Act of Mar. 29, 2017, ch. 97, 2017 Ariz. Sess. Laws; H.B. 2417, 53d Leg., 1st Reg. Sess. (Vt. 2017). ...*Open this footnote Close* The legal significance of this move stems from the underlying thrust of the AETA, which—like other state laws and the federal ESIGN Act—is designed to ensure that signatures cannot be denied legal effect merely due to their electronic form. 29*Open this footnote Close this footnote 29* See, e.g., Neuburger, *supra* note 28. ...*Open this footnote Close*

A similar bill passed the Nevada Senate unanimously in April 2017. 30*Open this footnote Close this footnote 30* Stan Higgins, *Nevada Senators Unanimously Advance Blockchain Tax Ban*, *CoinDesk* (Apr. 26, 2017, 4:24 PM), <https://perma.cc/GB68-URVH> (<https://perma.cc/GB68-URVH>); see S.B. 398, 2017 Leg., 79th Sess. (Nev. 2017). ...*Open this footnote Close* The Nevada bill tracks the Arizona amendment, but also prohibits local governments from taxing blockchain usage. 31*Open this footnote Close this footnote 31* Higgins, *supra* note 30. ...*Open this footnote Close* A Vermont law welcomed blockchain’s use in the courtroom by defining certain blockchain-based records as “business records” under the Vermont Rules of Evidence. 32*Open this footnote Close this footnote 32* Neuburger, *supra* note 28; see H. 868, 2016 Leg., Reg. Sess. (Vt. 2016). ...*Open this footnote Close*

Congress and other states have begun to follow suit. Delaware, Illinois, and others have established blockchain initiatives, 33*Open this footnote Close this footnote 33* Neuburger, *supra* note 28. ...*Open this footnote Close* and a Congressional Blockchain Caucus has formed on Capitol Hill. 34*Open this footnote Close this footnote 34* Mike Orcutt, *Congress Takes Blockchain 101*, MIT Tech. Rev. (Mar. 15, 2017), <https://perma.cc/53HP-U5LS> (<https://perma.cc/53HP-U5LS>) (“The heads of the Congressional Blockchain Caucus want their colleagues to know the technology has many uses besides currency.”). ...*Open this footnote Close* In Delaware specifically, lawmakers are considering, among other things, “amendments to Delaware General Corporation Law that would permit corporations to use blockchain for stock ledgers and other business records.” 35*Open this footnote Close this footnote 35* Neuburger, *supra* note 28. ...*Open this footnote Close* This follows proactive steps that have been taken on Wall Street, where blockchain-type software will soon be used to track trades of credit default swaps 36*Open this footnote Close this footnote 36* Nathaniel Popper, *Wall Street Clearinghouse to Adopt Bitcoin Technology*, *N.Y. Times: Dealbook* (Jan. 9, 2017), <https://perma.cc/ZS7E-TXRP> (<https://perma.cc/ZS7E-TXRP>). ...*Open this footnote Close* and where Nasdaq touted its first blockchain-aided share transaction more than a year ago. 37*Open this footnote Close this footnote 37* Bradley Hope & Michael J. Casey, *A Bitcoin Technology Gets Nasdaq Test*, *Wall St. J.* (May 10, 2015), <https://perma.cc/35AG-5FC2> (<https://perma.cc/35AG-5FC2>). ...*Open this footnote Close*

It seems, then, that the groundswell generated by blockchain is not an aberration but is here to stay. Indeed, one commentator boldly predicted that blockchain’s future impact will “compare to that of the internet,” 38*Open this footnote Close this footnote 38* Dusty Wunderlich, *Wunderlich: Blockchain—Nevada’s Next Horizon?*, *Reno Gazette-J.* (July 15, 2016 8:07 PM PT), <https://perma.cc/2XVE-9D34> (<https://perma.cc/2XVE-9D34>). ...*Open this footnote Close* and the rapid responses by Congress and state legislatures suggest that he may be right.

II. Preemption of State Laws by the Federal ESIGN Act (or Lack Thereof)

In spite of their policy appeal, many of these state reforms may be vulnerable to constitutional challenge. 39*Open this footnote Close this footnote 39* *Because the Constitution makes federal law supreme, state laws are void to the extent that they contradict federal law.* U.S. Const. art. VI (“This Constitution, and the Laws of the United States which shall be made in Pursuance thereof . . . shall be the supreme Law of the Land.”); *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1, 79 (1824) (“[T]he state law may be suffered to operate, in whole or in part, so far as it may, without actual conflict with the constitution or laws of the United States.”). ...*Open this footnote Close* Indeed, as the following Part describes, the federal ESIGN Act looms large in the field of electronic transactions and may preempt state UETA amendments like Arizona’s if left in its current form by Congress. 40*Open this footnote Close this footnote 40* Vermont, for one, has worried that any amendment to its state e-signature laws may trigger federal preemption by ESIGN. Condos et al., *supra* note 13, at 13. *The remainder of this Part addresses that concern.* ...*Open this footnote Close*

D. Federal Statutory Preemption: The Basics

Federal statutory preemption comes in two forms: express and implied. Express preemption is straightforward and occurs where a state law directly conflicts with a federal law. 41*Open this footnote Close this footnote 41* See, e.g., *Cipollone v. Liggett Grp., Inc.*, 505 U.S. 504, 516 (1992) (“Congress’ intent may be ‘explicitly stated in the statute’s language or explicitly contained in its structure or purpose.’” (quoting *Jones v. Rath Packing Co.*, 430 U.S. 519, 525 (1977))). ...*Open this footnote Close* Congress commonly preempts state statutes unambiguously, but even where it has refrained from doing so, preemption can still be implied. The Supreme Court has observed two forms of implied preemption: field preemption and conflict preemption. 42*Open this footnote Close this footnote 42* See, e.g., *Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm’n*, 461 U.S. 190, 203-04 (1983). ...*Open this footnote Close* Field preemption is relatively uncommon and occurs where Congress has shown an intent to occupy an entire topical field. 43*Open this footnote Close this footnote 43* For the “several ways” that “[s]uch a purpose may be evidenced,” see *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 230-31 (1947). ...*Open this footnote Close* Conflict preemption comes in two forms itself: first, where a state and federal law cannot logically coexist, as in a case where a party’s compliance with both laws is physically impossible; 44*Open this footnote Close this footnote 44* See, e.g., *Fla. Lime & Avocado Growers, Inc. v. Paul*, 373 U.S. 132, 142-43 (1963). ...*Open this footnote Close* and second, where a state law “stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.” 45*Open this footnote Close this footnote 45* *Hines v. Davidowitz*, 312 U.S. 52, 67 (1941). ...*Open this footnote Close*

A prominent substantive canon of statutory interpretation bears on this Essay’s preemption analysis as well—the “presumption against preemption.” The Supreme Court described the canon in *Medtronic, Inc. v. Lohr*:

[B]ecause the States are independent sovereigns in our federal system, we have long presumed that Congress does not cavalierly pre-empt [state law] In all pre-emption cases, and particularly in those in which Congress has “legislated . . . in a field which the States have traditionally occupied,” we “start with the assumption that the historic police powers of the States were not to be superseded by the Federal Act unless that was the clear and manifest purpose of Congress.” 46*Open this footnote Close this footnote 46* 518 U.S. 470, 485 (1996) (quoting *Rice*, 331 U.S. at 230) (citation omitted). ...*Open this footnote Close*

E. ESIGN and the UETA

The Uniform Electronic Transactions Act (UETA) 47*Open this footnote Close this footnote 47* *Unif. Elec. Transactions Act (Unif. Law Comm’n 1999) [hereinafter UETA]*. ...*Open this footnote Close* preceded ESIGN and has been adopted by forty-seven states. The UETA makes electronic signatures legally effective by prohibiting parties from denying them legal effect by simple virtue of their electronic form. 48*Open this footnote Close this footnote 48* *Id.* § 7. ...*Open this footnote Close* Thus, the UETA’s chief legal innovation is making electronic signatures just as legally valid as physical signatures.

In response to increased state adoption of the UETA, and with new forms of e-commerce beginning to flourish, Congress enacted ESIGN in 2000 in order to eliminate barriers to global e-commerce by unifying the nation’s law on the subject. 49*Open this footnote Close this footnote 49* Pub. L. No. 106-229, 114 Stat. 464 (2000) (codified as amended at 15 U.S.C. §§ 7001-7006, 7021, 7031 (2016)). ...*Open this footnote Close* ESIGN’s main provision simply restates the UETA’s major section:

[W]ith respect to any transaction in or affecting interstate or foreign commerce—
(1) a signature, contract, or other record relating to such transaction may not be denied legal effect, validity, or enforceability solely because it is in electronic form; and
(2) a contract relating to such transaction may not be denied legal effect, validity, or enforceability solely because an electronic signature or electronic record was used in its formation.
50*Open this footnote Close this footnote 50* 15 U.S.C. § 7001(a) (2015). Compare *id.*, with UETA § 7. ...*Open this footnote Close*

While this provision would ordinarily preempt state rules to the contrary, an additional section of ESIGN affirmatively exempts two categories of state law from preemption: (1) the original version of the UETA; and (2) state laws that specify “alternative procedures or requirements” that are (a) consistent with ESIGN; (b) do not “accord greater legal status of effect to” a “specific technology” within the parameters of ESIGN; and (c) reference ESIGN if enacted after ESIGN’s adoption. *51Open this footnote Close this footnote 51 15 U.S.C. § 7002(a). ...Open this footnote Close*

Functionally, then, ESIGN codifies much of the UETA at the federal level, while supplementing it with a few substantive provisions of Congress’s own. It also permits at least some state experimentation, to the extent that state modifications of the UETA’s original language comply with the requirements listed in the previous paragraph.

F. ESIGN and Arizona’s Blockchain Amendment—Preemption Analysis

1. Arizona’s UETA Amendment

This Essay considers whether Arizona’s blockchain amendment—one such state experiment—is preempted by ESIGN. If it is, other state laws modeled after it will likely suffer the same fate. Whether the Arizona amendment survives is a live question of statutory interpretation—specifically, whether ESIGN’s “exemptions to preemption” provision *52Open this footnote Close this footnote 52 Id. ...Open this footnote Close* allows the blockchain-related tweak to Arizona’s version of the UETA. This question raises several complicated interpretive issues that are ripe for litigation. Below, I offer my analysis of these issues and a prediction of how courts might resolve them.

To reiterate, the Arizona amendment legitimizes blockchain-based records by declaring that “[a] signature that is secured through blockchain technology is considered to be in an electronic form and to be an electronic signature.” *53Open this footnote Close this footnote 53 Act of Mar. 29, 2017, ch. 97, 2017 Ariz. Sess. Laws. ...Open this footnote Close* This amendment places blockchain-based records on par with preexisting forms of electronic records and signatures and requires parties and courts to grant blockchain-secured information full legal effect in spite of its nonwritten form.

2. Standard Categories of Statutory Preemption

Under the standard categories of preemption, the amendment likely survives. First, ESIGN does not appear to *expressly* preempt the amendment because it neither contemplates nor mentions blockchain and because express preemption is typically a tough showing, *54Open this footnote Close this footnote 54 Express preemption is a difficult finding because courts operate under a “basic assumption that Congress did not intend to displace state law.” Maryland v. Louisiana, 451 U.S. 725, 746 (1981). ...Open this footnote Close* especially in a field that—as here—“the States have traditionally occupied.” *55Open this footnote Close this footnote 55 Rice, 331 U.S. at 230. Because many states adopted versions of the UETA before Congress enacted ESIGN, and because the states have again beaten Congress to the punch in adopting blockchain legislation, it seems safe to say that “the States have traditionally occupied” the regulatory field at issue—or, at the very least, that they did so originally. Regardless, the regulation of contracts—the legal area that is most affected by ESIGN and its state counterparts—falls squarely within the traditional police powers of the states. See, e.g., Ogden v. Saunders, 25 U.S. (12 Wheat.) 213, 308 (1827) (Thompson, J.) (“The whole subject . . . of the regulation of contracts must remain with the States.”).* *...Open this footnote Close*

Second, *field* preemption is clearly not present because ESIGN affirmatively disclaims any congressional intent to occupy the entire field of electronic signature regulation by inviting state UETA laws to coexist with the federal statute. *56Open this footnote Close this footnote 56 15 U.S.C. § 7002(a) (2015). ...Open this footnote Close*

Likewise, *conflict* preemption does not apply since the Arizona amendment simply expands the universe of electronic information that cannot be denied legal force because of its electronic form—i.e., a party can comply with both the federal law and the Arizona amendment by either (a) granting legal force to blockchain-secured terms and signatures in spite of the fact the ESIGN does not contemplate blockchain; or (b) complying with the Arizona amendment in Arizona while reserving the right to reject such blockchain-secured items elsewhere.

Moreover, it is difficult to argue that the Arizona amendment is an *obstacle* to Congress’s achievement of its interest in passing ESIGN because ESIGN’s clear purpose is to expand—rather than restrain—electronic commerce. *57Open this footnote Close this footnote 57 Indeed, ESIGN aims to do so in its very first provision. See id. § 7001(a) (2015) (paving the way for improved electronic commerce by affording electronic signatures, contracts, and records a presumption of validity under federal law). ...Open this footnote Close* In addition, section 103 of ESIGN reveals that Congress knew how to include exceptions to the law’s general validation of electronic signatures, but chose not to foreclose the law’s extension to future innovations such as blockchain. *58Open this footnote Close this footnote 58 Id. § 7003 (2015) (outlining specific areas where the law’s general requirements shall not apply, such as, among others, contracts involving “adoption, divorce, or other matters of family law”). ...Open this footnote Close*

3. Reading the Statutory Text—ESIGN’s “Exemptions to Preemption” Provision

While ESIGN’s substantive provisions do not appear to preempt Arizona’s blockchain amendment under the aforementioned doctrines, the federal Act contains an “exemptions to preemption” provision that explicitly preempts state statutes that do not satisfy its particular requirements. *59Open this footnote Close this footnote 59 See id. § 7002. ...Open this footnote Close* Thus, the ultimate status of Arizona’s blockchain amendment depends on its validity under this provision: specifically, does the Arizona amendment constitute the type of UETA alteration that Congress expressly sought to preempt in section 102 of ESIGN? This inquiry requires a close look at section 102, and here, the fate of Arizona’s amendment is a closer call.

Delving into the language of section 102 reveals why. As the provision provides, state laws enacted after ESIGN are exempt from federal preemption “*only* if” any “alternative procedures or requirements for the use or acceptance (or both) of electronic records or electronic signatures” specified therein (1) are consistent with ESIGN, (2) do not “require, or accord greater legal status or effect to, the implementation or application of a specific technology or technical specification for performing the functions of creating, storing, generating, receiving, communicating, or authenticating electronic records or electronic signatures,” and (3) refer specifically to ESIGN. *60Open this footnote Close this footnote 60 Id. § 7002(a) (emphasis added). ...Open this footnote Close*

Ultimately, this language is ambiguous, and working through the statute reveals one thorny issue after another. To begin, the Arizona amendment seems to “specif[y]” an “alternative . . . requirement[] for the use or acceptance . . . of electronic records”—namely, a novel requirement that electronic records secured through blockchain be treated like any other electronic record and not denied legal effect. *61Open this footnote Close this footnote 61 Id. § 7002(a)(2)(A). ...Open this footnote Close* It may also “specif[y]” an “alternative procedure” for “the use or acceptance” of electronic records and signatures—namely, the use of blockchain to record and secure such records and signatures. As we know from the plain language of the rest of the provision, these kinds of “alternative procedures [and] requirements” are exempt from preemption *only* if certain statutory requirements are satisfied, which raises a pair of challenging issues:

First. Is the Arizona amendment “consistent with” ESIGN? *62Open this footnote Close this footnote 62 Id. § 7002(a)(2)(A)(i). ...Open this footnote Close*

Second. If so, does the Arizona amendment “require, or accord greater legal status or effect to, the implementation or application of a specific technology” for “creating, storing, generating, receiving, communicating, or authenticating electronic records or electronic signatures”? *63Open this footnote Close this footnote 63 Id. § 7002(a)(2)(A)(ii). ...Open this footnote Close*

In my view, the best interpretation is to allow Arizona’s amendment to stand—at least under the status quo. On a textual reading of ESIGN, Arizona’s amendment seems to align well enough with the requirements of section 102 of ESIGN to stave off preemption, particularly in light of the fact that ESIGN deals with legal areas that have traditionally fallen within the domain of the states. *64Open this footnote Close this footnote 64 Recall the venerable “presumption against preemption.” See supra text accompanying note 46. ...Open this footnote Close* On the first issue, the Arizona amendment seems “consistent with” ESIGN under a modern dictionary definition of “consistent.” *65Open this footnote Close this footnote 65 See Consistent, Webster’s Third International Dictionary 484 (3d ed. 2002) (defining “consistent” as “marked by harmony, regularity, or steady continuity throughout . . . coexisting and showing no noteworthy opposing, conflicting, inharmonious, or contradictory qualities or trends”). On a percentage basis, Webster’s Third is the Supreme Court’s general dictionary of choice. James J. Brudney & Lawrence Baum, Oasis or Mirage: The Supreme Court’s Thirst for Dictionaries in the Rehnquist and Roberts Eras, 55 Wm. & Mary L. Rev. 483, 529 (2013) (compiling Supreme Court opinions which cited dictionaries and observing Webster’s Third to be the general dictionary most frequently relied on in such opinions); see also Frank B. Cross, Essay, The Significance of Statutory Interpretive Methodologies, 82 Notre Dame L. Rev. 1971, 1973 n.6 (2007) (observing textualists’ fondness for dictionaries).* *...Open this footnote Close* By expanding the universe of electronic information that cannot be denied legal effect under the coexisting regimes of ESIGN and Arizona’s version of the UETA, the amendment is harmonious with plain language in ESIGN that serves that very function. Indeed, the plain language of ESIGN’s first section makes electronic “signature[s], contract[s], [and] other record[s]” legally enforceable. *66Open this footnote Close this footnote 66 15 U.S.C. § 7001(a)(1). ...Open this footnote Close* By granting enforceability to a new type of electronic record, the Arizona amendment does not diverge from this congressional language, but actually follows it.

This leads to the second issue: whether Arizona’s requirement that parties treat blockchain-secured data as they do other forms of electronic information “accord[s] greater legal status or effect to, the implementation or application of a specific technology” in dealing with electronic signatures. *67Open this footnote Close this footnote 67 15 U.S.C. § 7002(a)(2)(A)(ii). ...Open this footnote Close* Here also, the Arizona amendment seems fine from a textual standpoint because it accords *equal* (as opposed to *greater*) status to the “specific technology” of blockchain. Admittedly, a good lawyer could also reach the opposite conclusion. If “greater” means “greater status than had previously been granted to a particular technology” in this context, then Arizona’s law flunks this test. This reading seems counterintuitive, however, because the restrictive quality of the phrase “specific technology” *68Open this footnote Close this footnote 68 Webster’s Third defines “specific” as “intended for or restricted to a particular end or object.” Specific, Webster’s Third International Dictionary, supra note 65, at 2187 (emphasis added). ...Open this footnote Close* indicates that ESIGN’s drafters were chiefly concerned with prohibiting states from discriminating among competing technologies for storing electronic “signature[s], contract[s], [and] other record[s].” *69Open this footnote Close this footnote 69 15 U.S.C. § 7001(a)(1). ...Open this footnote Close* As ESIGN’s primary provision shows, it is a record’s “electronic

form” that matters to Congress, not the particular technology that enabled the record to appear in such a form. ⁷⁰*Open this footnote Close this footnote* ⁷⁰ *Id.* ...*Open this footnote Close* A state law that attributes greater or lesser weight to electronic information secured through a specific technology would undermine this plainly apparent goal of ESIGN; by placing blockchain-secured records on par with electronic records secured through preexisting technologies, Arizona’s amendment does no such thing.

While some courts might adopt this textual interpretation and end the inquiry here, it is worth noting that this conclusion is much easier to reach under a purposive interpretation of ESIGN. If Congress had a singular purpose in enacting ESIGN, it was to facilitate efficient electronic dealings in a “Cyber Age” ⁷¹*Open this footnote Close this footnote* ⁷¹ See *Packingham v. North Carolina*, 137 S. Ct. 1730, 1736 (2017) (*reflecting on the far-reaching impacts of the Internet*). ...*Open this footnote Close* by encouraging the use of new technologies in legal areas that have traditionally been subject to physical writing requirements. Arizona’s decision to recognize blockchain as a legitimate technology for gathering, storing, and reflecting electronic information aligns neatly with such a purpose.

Accordingly, I believe Arizona’s blockchain law can withstand federal preemption for now—at least until Congress intervenes with blockchain legislation of its own—but this conclusion is far from certain.

Conclusion

As private industries begin to recognize blockchain’s appeal, many states are taking legislative steps to grant full legal force to blockchain-based electronic information. While this is a good first step, blockchain-based records will remain in an awkward legal limbo until Congress clarifies ESIGN—or until courts adopt the interpretive view advocated by this Essay. In its present form, ESIGN affords states the cold comfort of a yellow light; states can forge ahead with blockchain laws modeled after Arizona’s, but they cannot be entirely certain that ESIGN’s exemptions to preemption provision gives them a green light to do so.

The best solution is clear: Congress should follow Arizona’s lead by amending ESIGN to explicitly define blockchain-secured records and signatures as “electronic signatures” that are entitled to legal effect. Congress should waste no time in doing so, as this moment is not unlike the last time Congress altered long standing legal regimes to account for burgeoning new technologies in 2000. By enacting ESIGN at that moment, Congress encouraged explosive growth in global e-commerce. By adopting bipartisan blockchain legislation, it can enable pioneers to harness blockchain’s world-changing potential today.

** J.D. Candidate, Notre Dame Law School, 2018. I am very grateful to the Stanford Law Review Online for accepting a student work, and for providing insightful critiques that improved the piece tremendously.*