

## Appendix

### Dataset for 1000 B.C. & 0 A.D.

Our technology adoption datasets for 1000 B.C. and 0 A.D. was based on Peregrine's (2003) "Atlas of Cultural Evolution" (henceforward abbreviated as "ACE"). We supplement the "ACE" data with several other sources. Two sources that were invaluable while coding these datasets were the *Atlas of World History* (O'Brien 1999) and *Hammond Past Worlds, The Times Atlas of Archaeology* (Scarre 1988). Both of these sources provided a historical overview of the time periods of interest.

We should note that technology adoption for the agricultural sector was measured both indirectly and on the intensive margin. The "ACE" dataset does not contain specific technologies that were employed in the agricultural sector; the data available documents the role that agriculture plays in a culture's subsistence. In the "ACE" dataset, there are three possible values that the agriculture variable can take: a "1" indicates that agriculture does not play a role in subsistence activities; while a "2" or "3" indicate that agriculture plays either a secondary or primary role in a culture's subsistence respectively. It is not unreasonable to assume that a culture's increased reliance on agriculture for subsistence is a function of agricultural technology adoption. Tools such as digging sticks, hoes, and ploughs were technologies employed by early agrarian societies in order to cultivate crops (Scarre 1988: 76-100). We therefore use a country's reliance on agriculture for its subsistence as an indirect measure of technology adoption. In addition, this measure captures the intensive margin of agricultural technology adoption. For example, suppose we are comparing two countries. One country relies on agriculture as a secondary means of subsistence, while the other country relies on it as its primary means of subsistence. We can infer that while both countries have adopted the same technologies (i.e. digging sticks), the country more dependent on agriculture for its subsistence has a more intensive level of technology adoption (i.e. more digging sticks being used).

### Dataset for 1500 A.D.

We code the entire dataset for 1500 A.D. following the same methodologies used by Peregrine (2003) and Murdock et. al. (1970; 1972; 1973). Table A2 presents all of the sources used to document the levels of technology adoption in each sector for each country. An unpublished dataset documents the presence or absence of various technologies for each country.

The dataset for 1500 A.D. relies on a number of inference techniques used to code the dataset. As we noted earlier, inference is used by many ethnographers to document the presence of cultural traits (Peregrine 2003; Murdock & Morrow 1970; Carneiro 1970; Tuden and Marshall 1972; Barry and Paxson 1971; Murdock and Wilson 1972). We discuss in greater detail the inference techniques used while coding the dataset for technology adoption in 1500 A.D.

One of the most daunting challenges of coding the dataset was documenting the absence of a technology in a country. Richard Bulliet (1975: 8) in *The Camel and the Wheel*, summarizes this problem as: "Proving that something did not exist at some time and place in the past is every historian's nightmare because there is always a nagging fear that evidence of its

existence may at some future date be found.” We have the greatest confidence in coding a technology as being absent in a country if a source specifically states this. Second best methods rely on temporal extrapolation. If a technology was first introduced into a country after the relevant time period (1000 B.C., 0 A.D., or 1500 A.D.), we infer that the technology was not present during the relevant time period.

There are a number of instances where it was difficult to document the presence of all technologies in a specific geographical area. One inference technique that we use is the diffusion of technology through trade and contact. If we are unable to document the presence of a technology in a particular country, we survey the adjacent countries. If an adjacent country had a specific technology, and if the adjacent country was engaged with a country through trade, we assume that the specific technology diffused across national borders.

In the following sections, we expand the discussion on each of the five technology sectors that are measured in 1500 A.D.

#### *Agricultural Technology in 1500 A.D.*

Agricultural technology adoption in 1500 A.D. is measured both indirectly and on the intensive margin, similar to the way we measure it in the datasets for 1000 B.C. and 0 A.D. We begin our data collection by measuring a country’s primary form of subsistence. A map of global food production in the 15<sup>th</sup> century from O’Brien’s (1999: 58) *Atlas of World History* is our primary source. O’Brien’s map divides the world into four food production zones. Each region of the world is classified as either having plough cultivation, hand cultivation, pastoralism, or hunting and gathering as its dominant form of subsistence. We then convert the four categories into numerical codes, with plough cultivation representing the most advanced form of agriculture and hunting and gathering as the most primitive form.

#### *Communications Technology in 1500 A.D.*

The documentation for coding the communications sector came from multiple sources. Martin’s (1988) *The History and Power of Writing* however, presents a concise overview on the diffusion of paper and printing.

Movable type printing spread rapidly after Gutenberg’s innovations and this technology was found in many major cities in Europe by 1480 (Eisenstein 1993:15). With the exception of Korea however, movable type printing was limited to Europe during the 1500 A.D. period (Carlson 2005a; Stearns 2001). We therefore code all of Africa and the Middle East as not having the movable type printing press.

In the New World, there is no evidence of a printing press before European contact. The first colonial printing press was set up in the United States in 1639 (Klose). The Inca Empire was the most advanced civilization in South America before European contact. The Incas were primarily an oral society; they had no written records (Scarre 1988: 222; Encyclopedia Britannica 2006e:1). We therefore code all countries that fall within the boundaries of the Inca Empire as not having paper, books, or the printing press. Given that

the Inca Empire was the most sophisticated in South America at the time, we infer that all countries not part of the Inca Empire also did not possess paper, books or printing technology. Writing did exist however in Mexico, Belize, Guatemala, and El Salvador before European contact (Carlson 2005: 89; Smith 2002: 240; Encyclopedia Britannica 2006f).

#### *Military Technology in 1500 A.D.*

One source that was particularly helpful when coding the technologies in this sector was Black's (1996) *Cambridge Illustrated Atlas of Warfare: Renaissance to Revolution 1492-1792*. This source provides a comprehensive overview of the weapons used in various conflicts in the early modern period. We use it as a basis for deciding which military technologies would be pertinent to document when measuring a country's level of military technology adoption.

The emphasis on firearms is due to their growing role in European military campaigns in the 16<sup>th</sup> century. The initial firearms used were the harquebus (or arquebus) which was a shoulder fired weapon developed in Spain in the mid-15<sup>th</sup> century (Encyclopedia Britannica 2006d). Muskets replaced the harquebus in the mid-16<sup>th</sup> century and provided increased firepower. Artillery also became an important technology beginning in the 15<sup>th</sup> century with bronze cannons; this technology progressed to cast iron artillery in the 16<sup>th</sup> century (O'Brien 1999: 158).

Naval weapons were used by all the leading military powers in the 16<sup>th</sup> century. Naval weaponry required the highest level of sophistication and resources. Black (1996: 61) in *The Cambridge Illustrated Atlas of Warfare: Renaissance to Revolution*, states "The wooden warship equipped with canon, whether driven by sails, muscle power, or both, was the single most costly, powerful and technologically advanced weapons system in the entire early modern period. By measuring a country's use of naval weaponry, we differentiate the leading military powers of 1500 A.D., including Spain, Portugal, France, and England from the rest of the world.

In our coding, we attempt to document the use of every military technology variable. However, in a number of cases, it is difficult to document the use or absence of every military technology. One inference technique we use is the technological continuity of military technology. For example, it was necessary for a country to possess firearm technology before warships with heavy naval guns could be built. We infer that since heavy warships were the pinnacle of military technology in 1500 A.D., countries which possessed them also had all other types of weapons technology. African countries that lacked firearms or muskets are coded as not having advanced military technologies (heavy naval warships). For example, the Songhai in Western Africa did not have firearms; this implies that they also did not have muskets, artillery, or large war ships armed with heavy naval guns.

#### *Transportation Technology in 1500 A.D.*

Transportation technology is measured using both land and sea based technologies. Land technology is measured by the presence of the wheel or animal driven vehicle. While the wheel and horse driven vehicles were used in Europe and parts of Asia for many centuries before 1500 A.D., these technologies were introduced into the New World only after European contact (Pacey 1990, Carlson 2005). In Africa (excluding Northern Africa) we

also infer that European settlers introduced the wheel as a transportation technology. Two countries that may have had the wheel by 1500 A.D. include Ethiopia and Morocco. Unfortunately we are unable to find sufficient documentation to make an educated guess about these countries; Ethiopia and Morocco are coded as not having wheel technology.

Naval technology adoption is measured both directly and indirectly. We directly measure the country's adoption of naval technology by documenting the use of the magnetic compass by a country's seamen. We infer that the magnetic compass was widely diffused throughout Europe by 1500 A.D.. The magnetic compass might have been independently invented in both Italy and China, or introduced into Europe from China by the Arabs sometime in the 13<sup>th</sup> century. It was used early on by Mediterranean countries. In Africa, we assume that while Mediterranean countries did use the compass, countries in Sub-Saharan Africa did not. The exceptions are countries in East Africa; we assume that because of trade with the Chinese, the compass was introduced before 1500 A.D. Finally, we assume that the magnetic compass was introduced into the New World by European explorers, and thus it did not exist prior to European contact.

Naval technology adoption is also indirectly measured by examining the distances traveled by country's naval fleet. It was during 1500 A.D. that several European countries sent out naval explorations; we document the transoceanic explorations of each country. We presuppose that ships able to cross either the Atlantic or Pacific Ocean must have used the most modern naval technology. An example of technology adopted for transoceanic voyages is the use of iron nails to connect a ship's external planking to frames of the bulkhead (Pacey 1990:65). These connections were able to withstand the punishment dealt by heavy seas encountered on trans-oceanic voyages. Thus, countries with ships that were able to travel across either the Atlantic or Pacific oceans are coded as having adopted advanced naval technology.

The variables that involve ships capable of traversing the Pacific and Atlantic Ocean are coded based on documented journeys by explorers. The countries with ships that crossed the Atlantic Ocean in 1500 A.D. were limited to: Britain, France, Spain and Portugal (O'Brien 1999). When the additional qualification of ships successfully crossing the Pacific Ocean is added, the list of countries is reduced to two: England and Spain. We infer that all African and New World countries did not have ocean traversing ships or advanced ship capabilities.

Finally, in order to differentiate the level of technology adoption by Asian countries, we include in the dataset countries which had ships that traversed the Indian Ocean

#### *Industrial Technology in 1500 A.D.*

We make several inferences while coding countries for their level of technology adoption in industry. While we are able to document several instances of steel use in Europe, we did not find documentation for every country. We infer that steel technology diffused throughout all of Europe by 1500 A.D. We also infer that iron technology diffused throughout Africa by 1500 A.D. In Africa, only North African countries controlled by the Ottoman Empire are coded as having steel.

**Table A1:  
Technology Adoption Dataset for 1500 A.D.  
Sources Used to Code Each Country And Sector**

Country	Civilization at 15 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Afghanistan	Lodis	O'Brien, P.K. ed. (1999: 58)	Stearns, P.N. (2001); Pacey, A. (1990); Cleveland, W.L. (2000)	Raymond, R. (1986)	Black, J. (1996)	Levi, S. C. (2002)
Algeria	Ottoman Empire	Ibid.	Diringer, D. (1948)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Ibid.	Bulliet, R. W. (1990)
Angola	Kongo Kingdom	Ibid.	Hochschild, A. (1999)	Hochschild, A. (1999); Bisson, M.S., Childs, S.T., Barros, P, & A.F.C. Holl (2000); Craddock, P.T. (1995)	Black, J. (1996); Gray R. ed. (1975); de Maret, P. (1997)	Hochschild, A. (1999); Liffé, J. (1995)
Argentina	Inca Empire	Ibid.	Scarre, C. ed. (1988); Encyclopædia Britannica (2006e)	Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b)
Australia		Ibid.	Needham, J. & T. Tsuen-Hsuin (1985)	Encyclopedia Britannica (2006i)	Grey, J. (1999)	Meredith, D. & B. Dyster (1999)
Austria	Christendom	Ibid.	Stearns, P.N. (2001)	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
Bangladesh		Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	Craddock, P.T. (1995)	Tarling, N. (2000)	Pacey, A. (1990) ; Christian, D. (1998); Chauduri, K.N. (1985)
Belize	Meso-American Post Classical	Ibid.	Carlson, W.B. (2005)	Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b)
Bolivia	Inca Empire	Ibid.	Scarre, C. ed. (1988); Encyclopædia Britannica (2006e)	Ibid.	Ibid.	P. (1990); C. (2005b); S. (1988) (c)
Bosnia & Herzegovina	Ottoman Empire	Ibid.	Stearns, P.N. (2001); Pacey, A. (1990); Steinberg, S. H, (1974)	Carlson, W.B. (2005a)	Black, J. (1996)	Bulliet, R. W. (1990); Adshead, S.A.M. (1988)
Botswana		Ibid.	Heine, B. & D. Nurse (2000)	Birmingham, D. & S. Marks (1977); Bisson, M.S., Childs, S.T., Barros, P, & A.F.C. Holl (2000); Craddock, P.T. (1995)	Edger, R. B. (2002)	Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Brazil		Ibid.	Scarre, C. ed. (1988); Encyclopedia Britannica (2006e)	Pacey, A. (1990)	Black, J. (1996)	P. (1990); C. (2005b); S. (1988) (c)
Burkina Faso	Songhai	Ibid.	Henry, P. (2000); Haskins, J. (1998); Bauer, S.W. (2003)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996); Willner, M., Martin, M. Weiner, J., Moore, D. & G. Hero (2000)	Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Burma		Ibid.	Giles H. & H. Pierson (1990); Tsuen-Hsun, Tsien (1985); Encyclopedia Britannica (2006b)	Bellwood, P. (1992); Needham, J. (1980)	Tarling, N. (2000); Andaya,L.Y. (1992)	Tarling, N. ed. (1992); Reid, A. (1992); Tarling, N. ed. (1992b)

Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Cambodia		Ibid.	Giles H. & H. Pierson (1990); Tsuen-Hsun, Tsien (1985)	Ibid.	Ibid.	Ibid.
Canada	Native Americans	Ibid.	Bishop, O.B. (1964); Gray, R. (2004)	Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b)
Central African Republic		Ibid.	Pankhurst, R. (2000)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Flint, J.E. (1976)	Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Chad	Bornu	Ibid.	Fisher, H.J. (1977)	Ibid.	Black, J. (1996); Fisher, H.J. (1977)	Ibid.
Chile	Inca Empire	Ibid.	Scarre, C. ed. (1988); Encyclopædia Britannica (2006e)	Pacey, A. (1990)	Black, J. (1996)	P. (1990); C. (2005b); S. (1988) (c)
China	Ming	Ibid.	Carlson, W.B. (2005); Pacey, A. (1990)	Carlson, W.B. (2005a); Golas, P.J. (1999)	Ibid.	Carlson, W.B. (2005a); Pacey, A. (1990); Adshead, S.A.M. (1988)
Colombia	Intermediate Area	Ibid.	Gardner, H., F.S. Kleiner & C.J. Mamiya (2004)	Pacey, A. (1990)	Ibid.	P. (1990); C. (2005b); S. (1988) (c)
Cook Islands	Cook Islands	Ibid.				
Costa Rica	Intermediate Area	Ibid.	Gardner, H., F.S. Kleiner & C.J. Mamiya (2004)	Pacey, A. (1990)	Ibid.	Pacey, A. (1990) ; Carlson, W.B. (2005b); Smalley, R. (2004)
Cuba	Taino	Ibid.	Encyclopedia Britannica (2006g)	Pacey, A. (1990)	Ibid.	Pacey, A. (1990) ; Carlson, W.B. (2005b); Smalley, R. (2004)
Czechoslovakia	Hussites	Ibid.	Stearns, P.N. (2001)	Carlson, W.B. (2005a)	Black, J. (1996); Chase, K. (2003)	Adshead, S.A.M. (1988)
Democratic Republic of Congo	Kongo Kingdom,	Ibid.	Hochschild, A. (1999)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Birmingham, D. & Marks, S. (1977)	Hochschild, A. (1999); Liffie, J. (1995); Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Denmark	Danes	Ibid.	Eisenstein, E.L. (1993); Encyclopædia Britannica	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
Ecuador	Inca Empire	Ibid.	Scarre, C. ed. (1988); Encyclopædia Britannica (2006e)	Pacey, A. (1990)	Ibid.	P. (1990); C. (2005b); S. (1988) (c)
Egypt	Ottoman Empire	Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996)	Bulliet, R. W. (1990)
El Salvador	Meso-American Post Classical	Ibid.	Carlson, W.B. (2005)	Pacey, A. (1990)	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005)
England	England	Ibid.	Eisenstein, E.L. (1993); Encyclopædia Britannica	Carlson, W.B. (2005a)	Black, J. (1996); Hall, A.R.. (1967)	O'Brien, P.K. ed. (1999); Pacey, A. (1990); Hall, A.R. (1967)

Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Ethiopia	Adal (Ahmad Gran)	Ibid.	Diringer, D. (1948); Sjostrom, M. & R. Sjostrom (1984)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996); Hrbek, I. (1977); Tamrat, R. (1977)	Lenski, G.E. (1984)
Fiji	Fiji	Ibid.				Carlson, W.B. (2005b)
Finland		Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
France	France	Ibid.	Carter, T.F. (1925)	Ibid.	Ibid.	O'Brien, P.K. ed. (1999); Pacey, A. (1990); Hall, A.R. (1967)
Germany	Lubeck	Ibid.	Stearns, P.N. (2001)	Ibid.	Ibid.	Hall, A.R. (1967)
Ghana	Asebu Army	Ibid.	Henry, P. (2000) ; Levitzion, N. (1977)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Ibid.	Lliffe, J. (1995); Lenski, G.E. (1984); Adler,P.J. & R.L. Pouwels (2005)
Greece	Ottoman Empire	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Ibid.	Bulliet, R. W. (1990); Adshead, S.A.M. (1988)
Greenland		Ibid.		Pacey, A. (1990)		
Guatemala	Meso-American Post Classical	Ibid.	Carlson, W.B.(2005); Encyclopedia Britannica (2006f)	Ibid.	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005); National Academy of Engineering (1984)
Guianas	Caribs	Ibid.	Carlson, W.B. (2005b); Smith, M.E. (2002)	Ibid.	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005b)
Guinea	Guinea Gold Coast	Ibid.	Henry, P. (2000); Haskins, J. (1998)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Vandervort, B. (1998)	Lenski, G.E. (1984)
Guinea-Bissau	Guinea Gold Coast	Ibid.	Henry, P. (2000); Haskins, J. (1998)	Ibid.	Vandervort, B. (1998)	Ibid.
Guyana		Ibid.	Scarre, C. ed. (1988); Encyclopedia Britannica (2006e)	Pacey, A. (1990)	Black, J. (1996)	P. (1990); C. (2005b); S. (1988) (c)
Honduras	Meso-American Post Classical	Ibid.	Carlson, W.B. (2005)	Ibid.	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005); National Academy of Engineering (1984)
Hungary	Hungary	Ibid.	Stearns, P.N. (2001)	Carlson, W.B. (2005a)	Ibid.	Adshead, S.A.M. (1988)
India	Mughal (Akbar - ruler), Rajput Confederacy	Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	Craddock, P.T. (1995); Raymond, R. (1986)	Black, J. (1996); Nicolle, D. (1993)	Pacey, A. (1990) ; Christian, D. (1998); Chauduri, K.N. (1985)
Indonesia	Aceh	Ibid.	Fischer, S.R. (2004); Encyclopedia Britannica (2006a)	Andaya,L.Y. (1992)	Black, J. (1996); Andaya,L.Y. (1992); Raffles, T.S. (1830)	Shaffer, L.N.
Iran	Safavid (Abbas I)	Ibid.	Stearns, P.N. (2001); Carter, T.F. (1925)	Craddock, P.T. (1995)	Black, J. (1996); Stearns, P.N. (2001); Parry, V.J. ; Ferris, Herwig, Travers, & Archer (2002)	Bulliet, R. W. (1990); Herbst, J. (2006); McGrail, S. (2004); Pearson, M.N. (2003)

Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Iraq	Ottoman Empire	Ibid.	Carlson, W.B. (2005); Stearns, P.N. (2001); Pacey, A. (1990)	Carlson, W.B. (2005a); Craddock, P.T. (1995)	Black, J. (1996)	Bulliet, R. W. (1990)
Ireland	Ireland	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Ibid.	Adshead, S.A.M. (1988)
Italy	Venice; Genoese	Ibid.	Pacey, A. (1990); Martin, H-J., translated by L.G. Cochrane (1988)	Ibid.	Ibid.	Suarez, T. (1992)
Japan	Nobunaga; Takeda; Hideyoshi (completed unification of Japan)	Ibid.	Pacey, A. (1990)	Scarre, C. ed. (1988); Needham, J. (1980)	Black, J. (1996); Encyclopedia Britannica (2006d); Stearns, P.N. (2001)	Totman, C. (1995); Gakushiin, N.; Rizo, T. (1999)
Kenya	Swahili	Ibid.	Carlson, W.B. (2005b)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Chase, K. (2003); Black, J. (2003); Peers, C. (2005)	Carlson, W.B. (2005); Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005); Krejci, J. (1990)
Korea	Yi-Sun-sin (leader)	Ibid.	Carlson, W.B. (2005a); Stearns, P.N. (2001)	Scarre, C. ed. (1988)	Black, J. (1996); Chase, K. (2003)	Needham, J. (1971); Atweel W. (1988)
Laos		Ibid.	Giles H. & H. Pierson (1990); Tsuen-Hsun, Tsien (1985)	Bellwood, P. (1992)	Tarling, N. (2000); Andaya, L.Y. (1992)	Tarling, N. ed. (1992a); Reid, A. (1992); Tarling, N. ed. (1992b)
Lesotho		Ibid.	Harnett-Sievers, A. ed. (2002)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (2003); Eldredge, E. (2002)	Lenski, G.E. (1984)
Lesser Antilles	Kulinago	Ibid.		Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b)
Libya	Ottoman Empire	Ibid.	Diringer, D. (1948)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Ibid.	Bulliet, R. W. (1990)
Lithuania		Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
Madagascar		Ibid.	Chittick, H.N. (1977)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Zacks, R. (2003); Flint, J.E. (1976); Snow, P. (1989)	Lenski, G.E. (1984)
Malaysia		Ibid.	Giles H. & H. Pierson (1990); Tsuen-Hsun, Tsien (1985)	Bellwood, P. (1992)	Andaya, L.Y. (1992)	Tarling, N. ed. (1992a); Reid, A. (1992)
Mali	Songhai	Ibid.	Henry, P. (2000); Haskins, J. (1998)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996); Willner, M., Martin, M., Weiner, J., Moore, D. & G. Hero (2000)	Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Malta	Maltese	Ibid.	Pacey, A. (1990); Martin, H-J., translated by L.G. Cochrane (1988)	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)



Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Mexico	Aztec	Ibid.	Carlson, W.B. (2005b); Smith, M.E. (2002)	Carlson, W.B. (2005b)	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005b); Smalley, R. (2004)
Micronesia	Micronesia	Ibid.				Carlson, W.B. (2005b)
Moldova	Ottoman Empire	Ibid.	Matei-Chesnoiu (2006)	Carlson, W.B. (2005a)	Ibid.	Bulliet, R. W. (1990)
Mongolia	0	Ibid.		Craddock, P.T. (1995); Hildinger, E. (2001)	Gernet, J. (1996)	Christian, D. (1999)
Morocco	Morocco	Ibid.	Pacey, A. (1990); Diringer, D. (1948); Liffé, J. (1995)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996); Stearns, P.N. (2001)	Bulliet, R. W. (1990)
Namibia	0	Ibid.	Harnceit-Sievers, A. ed. (2002)	Ibid.	Vandervort, B. (1998)	Lenski, G.E. (1984)
Nepal	Kathmandu	Ibid.	Tsuen-Hsun, Tsien (1985)			
Netherlands	Dutch	Ibid.	Updike, D.B (1980)	Carlson, W.B. (2005a)	Black, J. (1996); Glete, J. (2000); Cunningham, A. & O.P. Grell (2001)	O'Brien, P.K. ed. (1999); Pacey, A. (1990); Hall, A.R. (1967); Adshhead, S.A.M. (1988)
New Caledonia	New Caledonia	Ibid.				
New Zealand	Maori	Ibid.		Diamond, J. (1997)	New Zealand Herald (1890)	Carlson, W.B. (2005b)
Nicaragua	Intermediate Area	Ibid.	Gardner, H., F.S. Kleiner & C.J. Mamiya (2004)	Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b); Smalley, R. (2004)
Niger	Songhai	Ibid.	Henry, P. (2000); Haskins, J. (1998)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996)	Liffé, J. (1995); Lenski, G.E. (1984); Adler, P.J. & R.L. Pouwels (2005)
Nigeria	Bornu	Ibid.	Fisher, H.J. (1977)	Ibid.	Ibid.	Ibid.
Norway	0	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Ibid.	Adshhead, S.A.M. (1988)
Pakistan	0	Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	Craddock, P.T. (1995)		Pacey, A. (1990); Christian, D. (1998); Chauduri, K.N. (1985)
Panama	Intermediate Area	Ibid.	Gardner, H., F.S. Kleiner & C.J. Mamiya (2004)	Pacey, A. (1990)	Ibid.	Pacey, A. (1990); Carlson, W.B. (2005b); Smalley, R. (2004)
Papua New Guinea	Papua New Guinea	Ibid.				Carlson, W.B. (2005b)
Paraguay	0	Ibid.	Scarre, C. ed. (1988); Encyclopedia Britannica (2006e)	Pacey, A. (1990)	Ibid.	P. (1990); C. (2005b); S. (1988) (c)
Peru	Inca Empire	Ibid.	Ibid.	Ibid.	Ibid.	Ibid.
Philippines	Spanish Colony	Ibid.	Giles H. & H. Pierson (1990); Tsuen-Hsun, Tsien (1985)	Bourne, E.G. (1903)	Black, J. (1996); Kamen, H. (2004)	Shaffer, L.N.

Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Poland	0	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
Portugal	Portugal	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Ibid.	Ibid.	O'Brien, P.K. ed. (1999); Pacey (1990); Hall (1967); Adshead (1988)
Republic of the Congo	Kongo Kingdom,	Ibid.	Hochschild, A. (1999)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Birmingham, D. & Marks, S. (1977)	Hochschild (1999); Liffé (1995); Lenski, (1984); Adler. & Pouwels (2005)
Romania	0	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)		Adshead, S.A.M. (1988)
Russia	Russia	Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	Carlson, W.B. (2005a)	Black, J. (1996); Phillips, W.J. (1995)	Adshead, S.A.M. (1988)
Saudi Arabia	0	Ibid.	Carter, T.F. (1925); Diring, D. (1948)	Craddock, P.T. (1995)		Carlson, W.B. (2005); Ray, H.P. (2002)
Senegal	0	Ibid.	Henry, P. (2000); Haskins, J. (1998)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Thornton, J.K. (2000)	Lliffe, J. (1995); Lenski, G.E. (1984)
Serbia & Montenegro	Ottoman Empire	Ibid.	Stearns, P.N. (2001); Pacey, A. (1990); Steinberg, S. H. (1974)	Carlson, W.B. (2005a)	Black, J. (1996)	Bulliet, R. W. (1990); Adshead, S.A.M. (1988)
Siberia	Siberia	Ibid.			Ibid.	
South Africa	Western Region South Africa	Ibid.	Harneit-Sievers, A. ed. (2002)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Theal, G.M. (1888); Crosby, A.W. (2004)	Lenski, G.E. (1984)
Spain	Spain	Ibid.	Carter, T.F. (1925); Diring, D. (1948)	Carlson, W.B. (2005a)	Black, J. (1996)	O'Brien, P.K. ed. (1999); Pacey, A. (1990); Hall, A.R. (1967)
Sudan	Sudan (Central)	Ibid.	Fage, J.D.; Fisher, H.J. (1977)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Fisher, H.J. (1975)	Fage, J.D. (2001)
Sweden	Swedes	Ibid.	Eisenstein, E.L. (1993); Encyclopedia Britannica	Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
Switzerland	Swiss	Ibid.	Ibid.	Ibid.	Ibid.	Adshead, S.A.M. (1988)
Syria	Mameluke	Ibid.	Pacey, A. (1990); Carter, T.F. (1925)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996); Encyclopedia Britannica (2006c)	McGrail, S. (2004)
Tanzania	Swahili	Ibid.	Carlson, W.B. (2005b)	Ibid.	Gray R. ed. (1975); Chase, K. (2003); Black, J. (2003); Peers, C. (2005)	Lenski, G.E. (1984); Adler,P.J. & R.L. Pouwels (2005); Krejci, J. (1990)
Thailand	Ayutthaya; King Maha Thammarachi	Ibid.	Basche, J. R. (1971) ; Encyclopedia Britannica (2006b)	Bellwood, P. (1992); Duus, P. ed. (1989)	Stearns, P.N. (2001); Andaya, L.Y. (1992)	Tarling, N. ed. (1992a); Reid, A. (1992); Tarling, N. ed. (1992b)
Tonga	Tonga	Ibid.		Fletcher, M. (2001)	Diamond, J. (1997)	Carlson, W.B. (2005b)

Technology Adoption Dataset for 1500 A.D. (continued)						
Sources Used to Code Each Country And Sector						
Country	Civilization at 1500 A.D. (a)	Agriculture (1)	Communications (4)	Industry (2)	Military (8)	Transportation (6)
Tonga	Tonga	Ibid.		Fletcher, M. (2001)	Diamond, J. (1997)	Carlson, W.B. (2005b)
Tunisia	Ottoman Empire	Ibid.		C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996)	Bulliet, R. W. (1990); Lenski, G.E. (1984)
Turkey	Ottoman Empire	Ibid.	Stearns, P.N. (2001); Pacey, A. (1990); Steinberg, S. H, (1974)	Carlson, W.B. (2005a); Craddock, P.T. (1995)	Ibid.	Bulliet, R. W. (1990); Shaw, S.J. (1976); Inalick, H. (2001); King, D.A. (1999)
Uganda		Ibid.	Hameit-Sievers, A. ed. (2002)	C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Mazuri, A.A. ed. (1977)	Lenski, G.E. (1984)
Ukraine		Ibid.		Carlson, W.B. (2005a)	Black, J. (1996)	Adshead, S.A.M. (1988)
United States	Native Americans	Ibid.	Klose, N. (1994); Gray, R. (2004)	Pacey, A. (1990)	Black, J. (1996)	Pacey, A. (1990); Carlson, W.B. (2005b)
Uruguay		Ibid.		Ibid.	Ibid.	Ibid.
Uzbekistan	Uzbeks	Ibid.	Carter, T.F. (1925)		Chase, K. (2003); Encyclopedia Britannica (2006)	Kusmina, E. (2001)
Venezuela	Intermediate Area	Ibid.	Gardner, H., F.S. Kleiner & C.J. Mamiya (2004)	Ibid.	Ibid.	P. (1990); C. (2005b); S. (1988) (c)
Vietnam		Ibid.	Chandler, D.P. (1987); Tsuen-Hsun, Tsien (1985)	Bellwood, P. (1992)	Tarling, N. (2000); Andaya, L.Y. (1992)	Tarling, N. ed. (1992a); Reid, A. (1992); Tarling, N. ed. (1992b)
Western Africa Coast	Western Africa Coast	Ibid.		C. (2005b); B.,C.,B., & H. (2000); C. (1995) (b)	Black, J. (1996)	Lliffe, J. (1995)
Zambia		Ibid.		Ibid.	Brimingham, D. (2005); Thornton, J.K. (2000)	Lenski, G.E. (1984)
Zimbabwe		Ibid.		Ibid.		Ibid.

- (a) The civilization or culture during the 16<sup>th</sup> century that resided within the geographic borders of a present day country.
- (b) Carlson, W.B. (2005b); Bisson, M.S., Childs, S.T., Barros, P., & A.F.C. Holl (2000); Craddock, P.T. (1995)
- (c) Pacey, A. (1990); Carlson, W.B. (2005b); Scarre, C (1988)

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