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Employment in tangible-producing and intangible-producing industries

Preliminary findings and methodology

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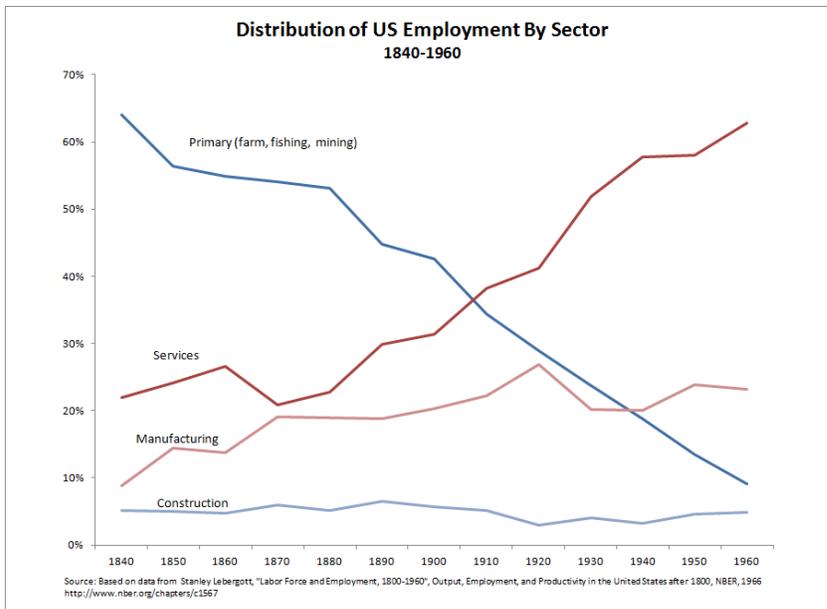
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The standard image of the U.S. economy is one of two mega-sectors: manufacturing and services. This is both outdated and misleading. It is still basically based on Colin Clark's 1940's division of the economy into primary, secondary and tertiary.¹ Over the years this has been simplified to goods versus services as the extractive industries (primary) have been lumped with the manufacturing (secondary) industries. This classification has been commonly used to declare that the U.S. has become a service economy.

However, using this framework to measure employment shows that the U.S. has been a "service" economy for 100 years. Employment data on agriculture/fishing/mining (primary), manufacturing, construction and services shows the US jumped from directly from agriculture

to services. We were never a majority manufacturing economy. Manufacturing peaked at around 27% of total employment in 1920 (30% for combined manufacturing & construction) with services at the same time comprising around 41% of total employment.²

Thus, that most people work in service industries tells us little about the structural



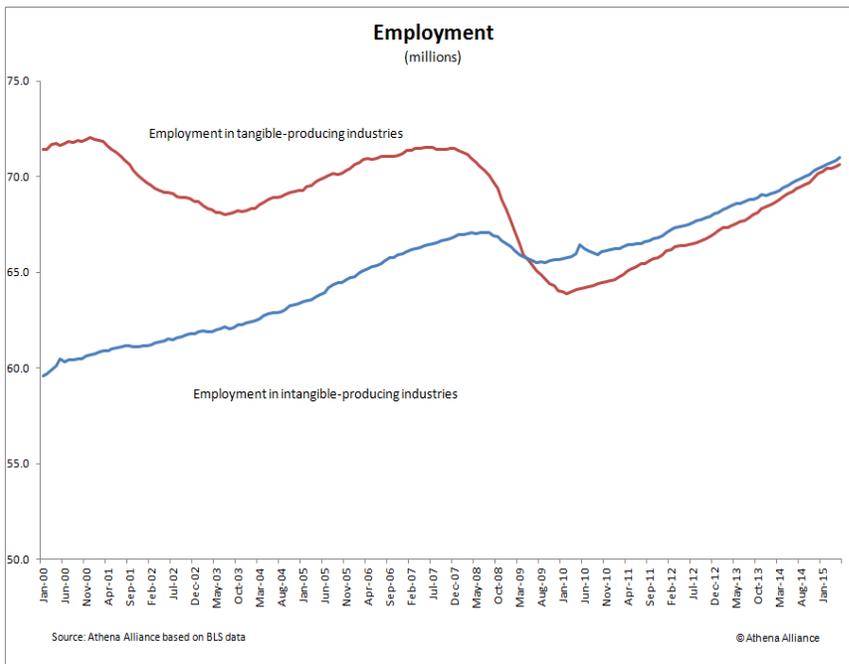
changes occurring in the economy. Rather than break up the economy into manufacturing versus services, it may be more useful to look at the economy as tangible and intangible. Tangible activities are primarily physical; intangible are primarily mental. Cutting hair, ringing up a sale at a cash register, making a car, harvesting a crop—all of these are primarily a physical activity. The transaction involves the movement of atoms. Designing a poster, negotiating a deal, writing an article—these are primarily mental involving the manipulation of information bits.

	Tangibles	Intangibles
Goods	<i>Cars, houses, food, clothing</i>	<i>Packaged software</i>
Services	<i>Taxi drivers, housecleaners, restaurants, tailors</i>	<i>Doctors, lawyers, bankers, entertainers, teachers</i>

Source: Athena Alliance

Intangible, mental activities are more important than ever in this information economy. But tangible, physical activities are just as important. Some of those physical activities are captured by the current classification system as part of construction, agriculture and manufacturing. And some of those mental activities are correctly classified as services.

But only some. For example, the construction sector contains many mental activities such as architecture, engineering and logistical planning. The service sector contains physical activities, such as truck drivers, barbers and gardeners.



Source: Athena Alliance based on BLS data

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To capture this structure I have developed an alternative look at the U.S. economy and employment that divides employment into jobs in tangible-producing industries (including tangible services) and jobs in intangible-producing industries.³

As the chart shows, U.S. employment in tangible producing industries and intangible producing industries is just about

equal. What we have seen in the past decade is a great convergence, due in large part to the loss of jobs in the tangible-producing industries during the Great Recession.

According to my estimates, employment in tangible producing industries grew by 433,600 jobs in that period while employment in intangible producing industries grew by 615,500 jobs. The biggest gain was in Professional & Business Services; the smallest in Mining & Construction.

Tangible vs Intangible Economy Employment (thousands)	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
Tangible	70275.2	70413.6	70419.1	70512.4	70612.2	70708.8
Construction and Mining	7222	7239	7213	7229	7226	7223
Manufacturing	12318	12321	12327	12327	12334	12338
Trade, Transportation and Utilities	26704	26748	26787	26807	26852	26901
Accommodation and Food Services	12845.4	12903.7	12895.5	12906.8	12933.4	12959.6
Repair and Maintenance	1258.7	1265.8	1264	1264.2	1267.5	1272.3
Personal and Laundry Services	1382.5	1379	1381.9	1386.7	1389.8	1392.8
Telecommunications	861.2	861.6	864.1	868.8	868.7	869.1
Tangible business services	2940.7	2949.6	2941.5	2962.3	2973.4	2974.6
Tangible education and health services	4151.3	4150.5	4150.2	4164.8	4172.2	4182.7
Intangible	70517.8	70644.6	70758.5	70852.5	71007	71133.3
Membership associations and organizations	2974.6	2980.9	2980	2983.2	2984.8	2986.7
Arts, Entertainment, and Recreation	2126.8	2128.8	2143.2	2140	2167.7	2163.7
Information (excluding telecommunications)	1911.8	1918.4	1913.9	1919.2	1918.3	1924.9
Financial Activities	8068	8077	8090	8097	8107	8127
Professional and Business Services (excluding tangible services)	16518.3	16558.4	16605.5	16650.7	16713.6	16776.4
Educational and Health Services (excluding tangible services)	17608.7	17670.5	17712.8	17752.2	17800.8	17840.3
Government (excluding Postal Service)	21309.6	21310.6	21313.1	21310.2	21314.8	21314.3
Total	140793	141058.2	141177.6	141364.9	141619.2	141842.1

Source: Athena Alliance based on BLS data

Change in Tangible vs Intangible Employment (from previous month in thousands)	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
Tangible	129.2	138.4	5.5	93.3	99.8	96.6
Construction and Mining	34	17	-26	16	-3	-3
Manufacturing	17	3	6	0	7	4
Trade, Transportation and Utilities	35	44	39	20	45	49
Accommodation and Food Services	30.7	58.3	-8.2	11.3	26.6	26.2
Repair and Maintenance	5.4	7.1	-1.8	0.2	3.3	4.8
Personal and Laundry Services	1.8	-3.5	2.9	4.8	3.1	3
Telecommunications	-0.3	0.4	2.5	4.7	-0.1	0.4
Tangible business services	2.1	8.9	-8.1	20.8	11.1	1.2
Tangible education and health services	9.7	-0.8	-0.3	14.6	7.4	10.5
Intangible	72.4	126.8	113.9	94	154.5	126.3
Membership associations and organizations	-1.9	6.3	-0.9	3.2	1.6	1.9
Arts, Entertainment, and Recreation	-6.4	2	14.4	-3.2	27.7	-4
Information (excluding telecommunications)	6.3	6.6	-4.5	5.3	-0.9	6.6
Financial Activities	19	9	13	7	10	20
Professional and Business Services (excluding tangible services)	17.9	40.1	47.1	45.2	62.9	62.8
Educational and Health Services (excluding tangible services)	32.3	61.8	42.3	39.4	48.6	39.5
Government (excluding Postal Service)	5.2	1	2.5	-2.9	4.6	-0.5
Total	201.6	265.2	119.4	187.3	254.3	222.9

Source: Athena Alliance based on BLS data

Methodology

The analysis starts with the U.S. Bureau of Labor Statistics (BLS) major industry groups.⁴ Each industry group or their constituent subcategories is assigned to either tangible producing or intangible producing. In some cases, such as Trade, Transportation & Utilities (tangible) and Financial Activities (intangible), the entire group is assigned. In others, the group is divided, such as Leisure and Hospitality being divided into Arts, Entertainment, & Recreation (intangible) and Accommodation & Food Services (tangible). In some cases, the tangible part of the industry group (such as Professional & Business Services) is calculated from subcategories and the intangible part is the remainder.

The tangible sector is made up of the following industries: Construction & Mining; Manufacturing; Trade, Transportation & Utilities; Accommodation & Food Services; Repair & Maintenance; Personal & Laundry Services; Telecommunications; Tangible business services (specifically Waste Management & Remediation Services, Services to Buildings & Dwellings and the U. S. Postal Service); and Tangible Educational & Health Services (specifically Nursing & Residential Care Facilities and Child Day Care Services).

The intangible sector consists of Membership associations & organizations; Arts, Entertainment, & Recreation; Information (excluding telecommunications); Financial Activities; Professional & Business Services (excluding tangible services); Educational & Health Services (excluding tangible services); and Government (excluding Postal Service).

Construction & Mining and Manufacturing are assigned completely to the tangible-producing industry. Since we are using nonfarm payroll employment data from the BLS Current Employment Survey (CES), agriculture is not included as a tangible-producing industry. This may change in future revisions.

The major industry group of Trade, Transportation & Utilities contains industries that involve physical activities and/or the movement of physical products in one form or another. These include retail trade, wholesale trade, transportation & warehousing and utilities. The entire group is assigned to the tangible-producing category.

Telecommunications is treated as a tangible-producing industry and split off from Information. According to BLS, this category contains industries involved in operating the physical telecommunications infrastructure.

The remainder of the Information industry group is categorized as intangible-producing.

Accommodation & Food Services also involve physical activities. Therefore they are split off from the Leisure and Hospitality group and treated as tangible-producing industries.

The industry group of Arts, Entertainment & Recreation is other half of Leisure and Hospitality. For the most part, these involve intangible-producing industries even though the activities may be physical. For this analysis the entire group is treated as intangible-producing. Future revisions may involve a more detailed breakdown of this group.

Financial Activities are all classified as intangible-producing.

Professional & Business Services are divided into tangible and intangible-producing. Waste Management & Remediation Services and Services to Buildings & Dwellings are broken out of the major industry group and assigned to a new category of Tangible Business Services. These industries are physically based, such as janitorial services, and are very different from other business services, such as accounting.

The remainder of the Professional & Business Services group is categorized as intangible-producing.

The new category of Tangible Business Services also contains the U. S. Postal Service. This is considered a physical activity similar to transportation and warehousing.

All other Government employment is classified as intangible-producing. Some parts of government might be similar to the Postal Service in being tangible-producing, such as law enforcement. However, data on that level of employment within the various level of government is difficult to find. The BLS publishes a specific breakout of Postal Service employment which allows us to categorize those jobs separately as tangible-producing. Future revisions may look at refining the data.

The major industry group of Educational & Health Services is also divided into tangible and intangible-producing. Specifically Nursing & Residential Care Facilities (part of Health Services) and Child Day Care Services (part Social Services) are classified as tangible-producing as they involved mostly physical activities. They are assigned to a new category of Tangible Education and Health Services

All other parts of Health Services and Social Services and all of Education Services are considered intangible-producing. Again future revisions may look at refining this breakdown.

The BLS major industry group of Other Private Services is broken down by its constituent parts. Repair & Maintenance and Personal & Laundry Services are classified as tangible-producing. Membership Associations & Organizations are intangible-producing industries.

Conclusion

The traditional division of industries and employment into goods producing (manufacturing, mining & construction) and services producing does not adequately capture the essence of the structure of the U.S. economy. This paper has sought to provide an alternative view based on tangible-producing and intangible-producing industries. The resulting analysis shows a recent convergence of the two areas of employment with the economy rough split between the two.

Of course, the division of industries into tangible-producing and intangible-producing misses the interaction between the two. Intangible assets are needed in the production of tangibles

products (e.g. R&D in manufacturing). Tangibles are needed in the production of intangibles (e.g. computers in knowledge creation).

Nor does the classification of companies into tangible-producing and intangible-producing clearly capture activities and outputs. For example, Amazon is considered an information technology company and a retail company. Part of their "product" is their computer infrastructure and algorithms (intangibles). Another part is the labor of the workers in their fulfillment centers.

This analysis is clearly exploratory and preliminary. But the framework is robust. Further revisions and expansions will help refine the findings.

Appendix

Table 1: Categorization of Tangible and Intangible-Producing by Specific Industry

with BLS category codes

Tangible producing

Construction & Mining - sum of:

CES1000000001 Construction

CES2000000001 Mining

Manufacturing:

CES3000000001 Manufacturing

Trade, Transportation & Utilities:

CES4000000001 Trade, Transportation & Utilities

Telecommunications:

CES5051700001 Telecommunications

Tangible business services - sum of:

CES6056170001 Services to Buildings & Dwellings (under Professional & Business Services, Administrative and waste services, Administrative and support services)

CES6056200001 Waste Management & Remediation Services (under Professional & Business Services, Administrative and waste services)

CES9091912001 U. S. Postal Service (under Government)

Tangible education & health services - sum of:

CES6562300001 Nursing & Residential Care Facilities (under Education and health services, Health services)

CES6562440001 Child Day Care Services (under Education and health services, Social services)

Accommodation & Food Services:

CES7072000001 Accommodation & Food Services (under Leisure and Hospitality)

Repair & Maintenance:

CES8081100001 Repair & Maintenance (under Other Private Services)

Personal & Laundry Services:

CES8081200001 Personal & Laundry Services (under Other Private Services)

Intangible producing

Financial Activities

CES5500000001 Financial Activities

Information:

CES5000000001 Information

minus

CES5051700001 Telecommunications

Intangible business services:

CES605400001 Professional and technical services

minus Tangible business services (as calculated above)

Educational & Health Services:

CES6500000001 (Educational & Health Services)

minus

Tangible education & health services (as calculated above)

Arts, Entertainment, & Recreation:

CES7071000001 Arts, Entertainment, & Recreation (under Leisure and Hospitality)

Membership associations & organizations:

CES8081300001 Membership associations & organizations (under Other Private Services)

Government:

CES9000000001 Government

minus

CES9091912001 U. S. Postal Service

Table 2: Categorization of Major Industry Groups

CES1000000001 Construction - tangible

CES2000000001 Mining - tangible

CES3000000001 Manufacturing - tangible

CES4000000001 Trade, Transportation & Utilities - tangible

CES5000000001 Information - divided

CES5051700001 Telecommunications - tangible
remainder - intangible

CES5500000001 Financial Activities - intangible

CES6000000001 Professional & Business Services - divided

CES6056170001 Services to Buildings & Dwellings (under Administrative and waste services, Administrative and support services) - tangible

CES6056200001 Waste Management & Remediation Services (under, Administrative and waste services) - tangible

CES9091912001 U. S. Postal Service (under Government) - tangible
remainder - intangible

CES6500000001 Educational & Health Services - divided

CES6562300001 Nursing & Residential Care Facilities (under Health services) - tangible

CES6562440001 Child Day Care Services (under Social services) - tangible
remainder - intangible

CES7000000001 Leisure and Hospitality - divided

CES7072000001 Accommodation & Food Services - tangible

CES7071000001 Arts, Entertainment, & Recreation - intangible

CES8000000001 Other Private Services - divided

CES8081100001 Repair & Maintenance - tangible

CES8081200001 Personal & Laundry Services - tangible

CES8081300001 Membership associations & organizations - intangible

CES9000000001 Government - divided

CES9091912001 U. S. Postal Service - tangible
remainder - intangible

Notes

¹ Colin Clark, *The Conditions of Economic Progress*, Macmillan, London, 1940.
Note that in later editions Clark used the word "services" rather than "tertiary".

² Source: Based on data from Stanley Lebergott, "Labor Force and Employment, 1800-1960", *Output, Employment, and Productivity in the United States after 1800*, NBER, 1966
<http://www.nber.org/chapters/c1567>

³ Monthly updates are available on the Intangible Economy blog
<http://www.intangibleeconomy.org>.

⁴ See <http://www.bls.gov/web/empsit/cesseriespub.htm>