

Using Link Analysis To Identify Indirect and Multi-Tiered Ownership Structures

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Partnerships are a fundamental business structure in the American economy. They permit groups of investors to combine their resources toward a common effort without the administrative overhead of a formal corporation. Their tax treatment also allows each investor to be responsible for their own portion of federal taxes by passing through the proportional amounts of tax items to the individual investors to be reported on their separate tax returns. Partnerships, along with the other entities that allocate tax items to their investors (mostly Subchapter S corporations and trusts) are collectively referred to as pass-through entities. A partnership or other pass-through entity can also combine its collective resources with the resources of others to form a second level pass-through entity or tier. This tiering strategy can repeat for many levels. As capitalization efforts grow for large endeavors, such as oil & gas exploration, medical research & development, or large commercial real estate development, the depth and complexity of these pass-through structures also grows. Many other valid business reasons, such as liability constraints, contribute to the ever increasing complexity of pass-through structures. Tax law must accommodate these business arrangements; however, in doing so, it has afforded the opportunity for unscrupulous taxpayers to diffuse and obfuscate bogus transactions to obtain unjustified tax benefits.

This paper will detail efforts to use link analysis to bring together these multiple tax entities, summarize their activity, and enhance transparency. Specifically, the paper will discuss the analysis of enterprise structures. Enterprise structure analysis is an attempt to identify, summarize, and analyze the collection of pass-through entities controlled by a common taxpayer. It is focused on an investor and the pass-throughs that investor is able to control. Only linkages collectively representing 50% or more ownership are retained as part of the structure.

Background

The tax law is founded on the premise of unrelated parties engaged in activity for their own economic interest. Many abusive schemes are accomplished by the structure of a transaction at less than arm's length. Unscrupulous individuals will attempt to obtain benefits by structuring transactions between separate legal entities that are, in fact, ultimately owned and controlled by the same taxpayer. There are valid business reasons for the segregation of one's business operations into separate legal entities but it also introduces the opportunity for abuse. As such, it is important for the IRS to recognize these segmented operations and assess their compliance risk as a single cohesive unit.

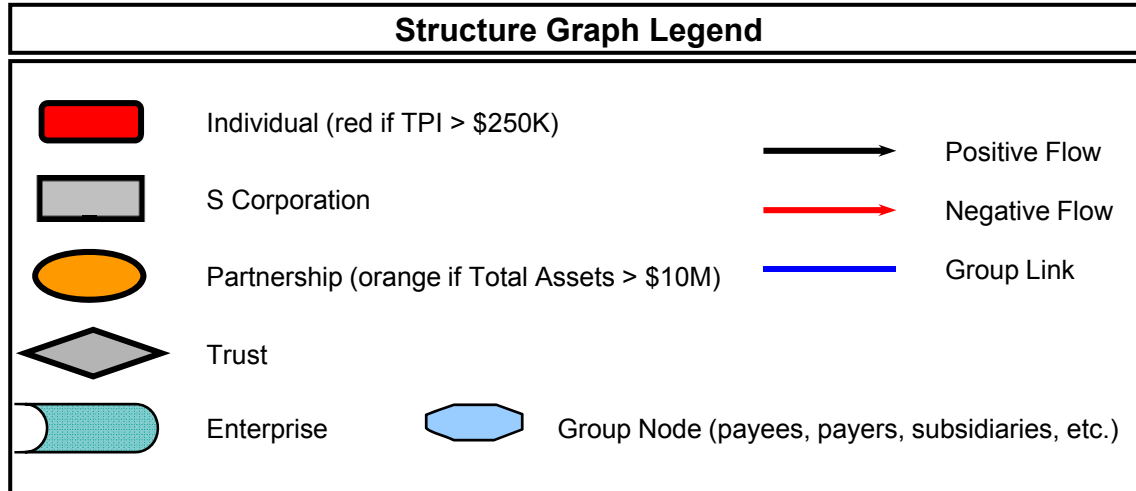
Creating enterprise structures is an initial attempt to identify all economic activity under the common control of a taxpayer. Current analysis is limited to pass-through relationships, parent/subsidiary links, and primary/secondary SSN associations. The investments of secondary spouses and subsidiary corporations are considered 100% owned by the primary spouse or parent corporation. This, by no means, covers all relationships that establish common control; others include non-flow-through business ownership (stock in a C corporation), related family members, and significant employer/employee relationships. Since the intent of enterprise structures is to identify economic relationships, it is also limited to structures with at least two business entities.

Currently we define common control as direct and indirect ownership of 50% or more of another entity conceptually consistent with Internal Revenue Code section 267(c) and section 707(b). Frequently, the ownership percentage requested on K-1 documents is not expressed as a number. Entries such as "various," "avail-

able” and “per agreement” make this data field unreliable for analysis. To mitigate this, an individual investor’s proportion of total positive or total negative allocations is used as a proxy for ownership percentage.

Before addressing methodology and results, it is appropriate to provide an icon legend for the investment structure graphs presented in this paper:

FIGURE 1. Investment Structure Legend



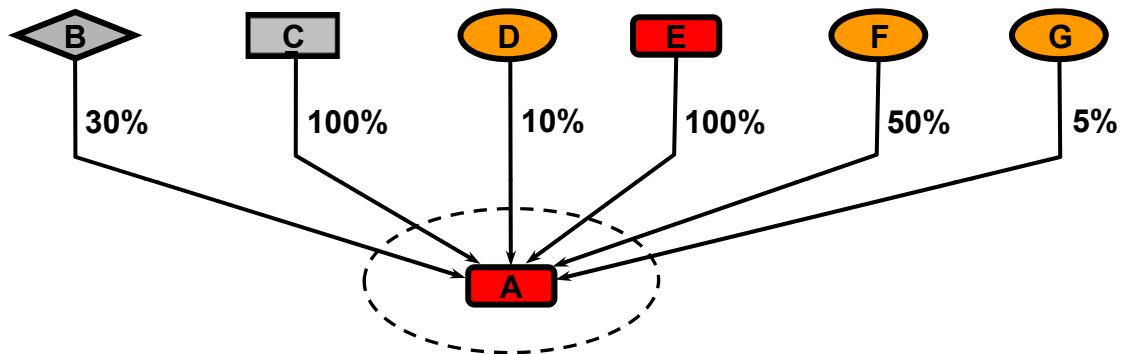
Aggregation Methodology

Creating enterprise structures is a fairly straightforward technique:

1. Start with an entity that does not allocate income to other entities, usually an individual or a corporation. Consider this initial entity the enterprise.
2. Identify all investment entities in which the enterprise has 50% or more direct ownership.
3. Merge the entities identified in step 2 into the enterprise.
4. Repeat steps 2 and 3 until no additional entities are added to the enterprise.

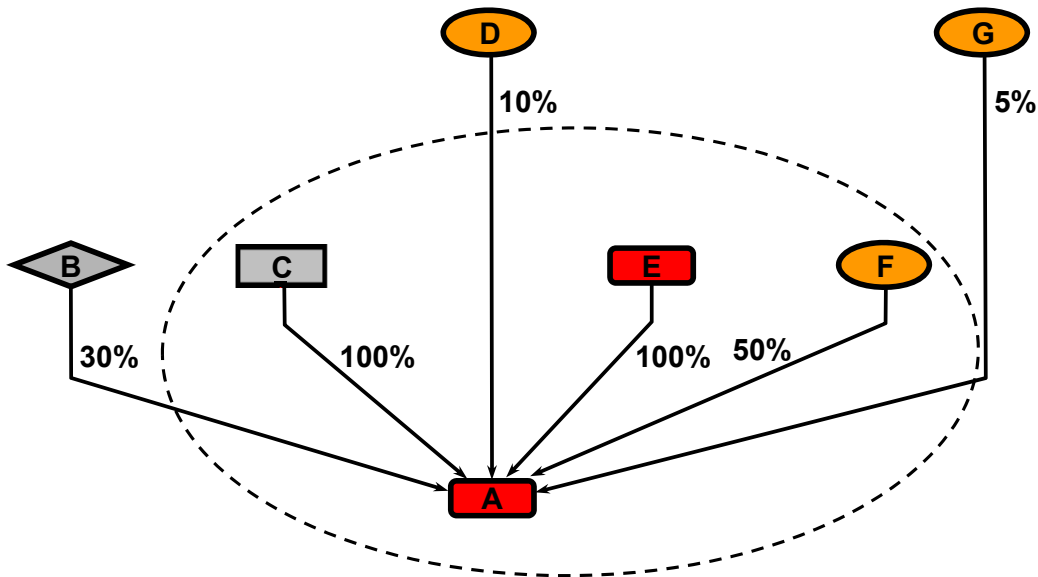
To illustrate this technique, Figure 2 shows a high-income individual (A) with a spouse (E), a trust (B), a wholly owned subchapter S corporation (C) and 3 partnership investments (D, F, G). The structure includes the ownership percentage for each entity. The enterprise boundary is represented with a dashed line.

FIGURE 2. Initial Investment Structure (Direct Investments)



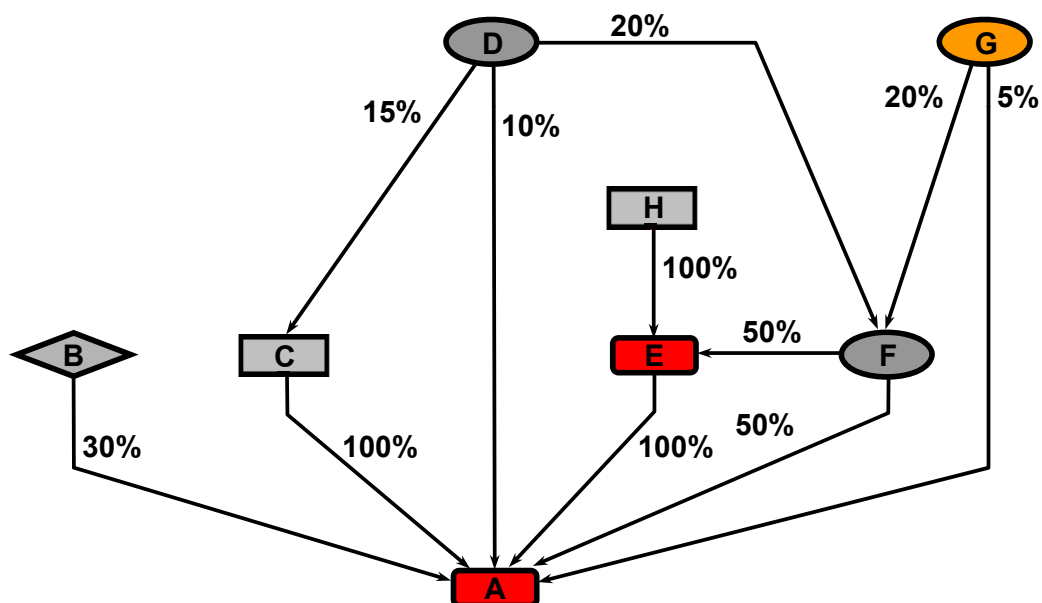
The spouse of the individual is pulled into the enterprise because the taxpayer is deemed to own the spouse's investments. Further, the individual owns 50% or more of the Subchapter S Corporation "C" and partnership "F"; so, they, too, are included in the enterprise.

FIGURE 3. Enterprise Investment Structure After 1st Pass



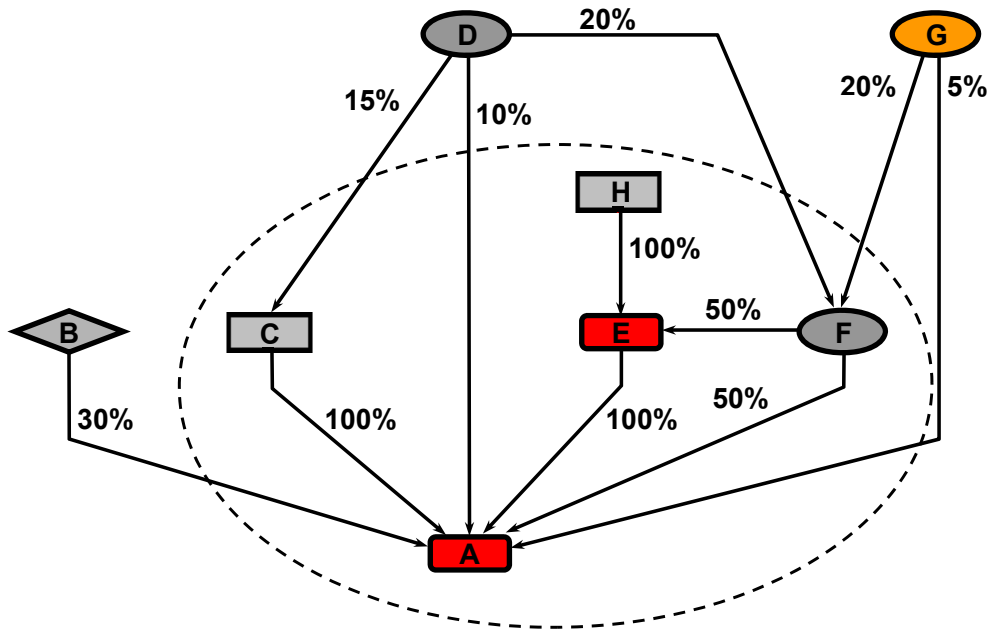
Steps 2 and 3 are now repeated. We expand our scope and look at the direct investments of the spouse, the subchapter S corporation "C" and partnership "F". The spouse has a 50% investment in partnership "F". This is really immaterial since both the spouse and partnership "F" are already part of the enterprise. The spouse also has a 100% investment in a new entity; a subchapter S corporation (entity H). Partnership "F" has a 20% interest in both Partnership "D" and Partnership "G". We also find that subchapter S corporation "C" has a 15% interest in Partnership "D." The updated graph with the new entities and lines of allocation is shown in Figure 4.

FIGURE 4. Enterprise Investment Structure Addition of 2nd Pass Linkages



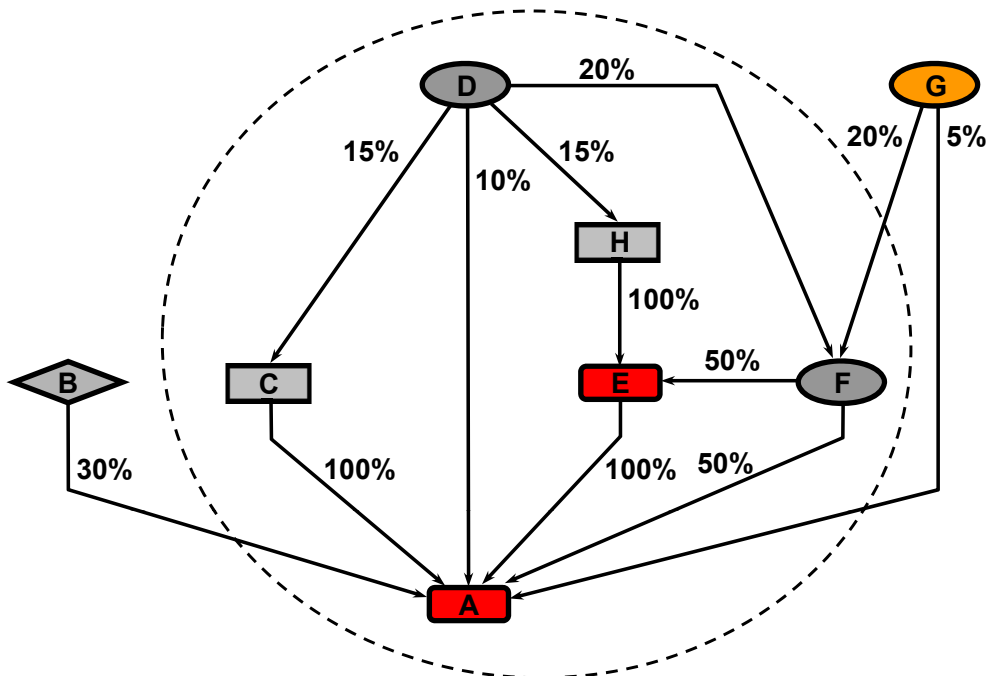
The enterprise ownership of “D” has increased from 10% to 45% and the ownership of “G” has increased from 5% to 25%. Neither has crossed the 50% threshold. However, the newly added Subchapter S Corporation “H” is owned 100% by the enterprise and is merged into it.

FIGURE 5. Enterprise Investment Structure After 2nd Pass



Having merged “H” into the enterprise it is time to repeat steps 2 and 3 again. “H” has one investment; it is a 15% investment in “D.” This increases the enterprise investment in “D” from 45% to 60% and “D” collapses into the controlled enterprise structure.

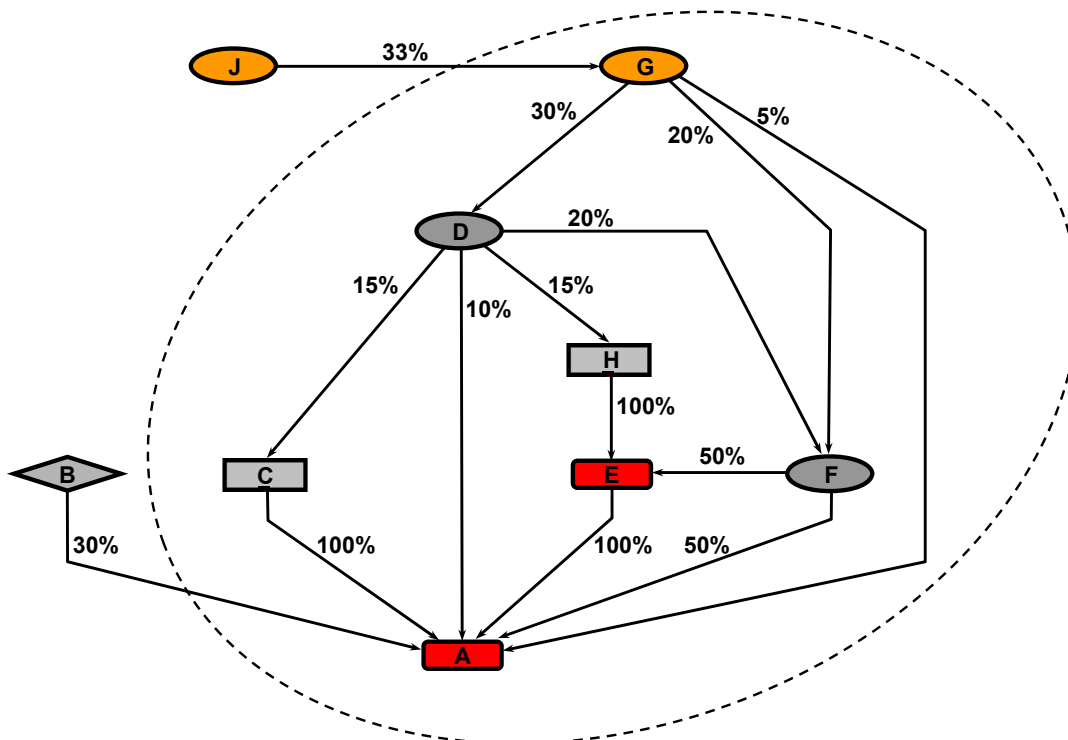
FIGURE 6. Enterprise Investment Structure After 3rd Pass



Repeating steps 2 and 3 again for the newly added entity “D” reveals a 30% investment in “G.” This raises the enterprise’s ownership of “G” above the 50% threshold to 55% and “G” becomes the 7th entity in the enterprise. Looking at the investments of “G” reveals a 33% investment in a new partnership (J). The investments of entity “G” did not create a controlling interest in either an existing or new entity so expansion stops.

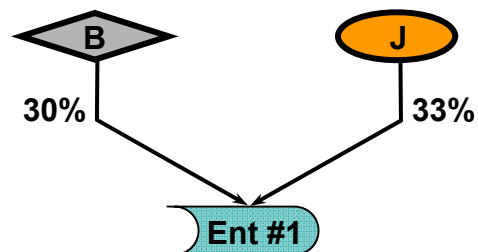
Our final enterprise structure consists of two individuals (A and E), two subchapter S corporations (C and H), and three partnerships (D, F and G). Note that partnerships “D” and “G” are not owned 100%. There are other investors; however, “A” owns directly or indirectly 60% of “D” and 55% of “G.” “A’s” enterprise has two investments that don’t rise to the level of a controlled entity; a 30% interest in trust “B” and a 33% interest in partnership “J.”

FIGURE 7. Enterprise Investment Structure; Final Structure



The above graph can be greatly simplified if the detail of the enterprise structure is represented as a single enterprise icon:

FIGURE 8. Enterprise Investment Structure Using Enterprise Icon



The process outlined so far is applied to all entities that do not allocate income to another entity and also have a direct controlling interest (or spousal/subsidiary interest) in at least one other entity. Once completed, entities not incorporated into an enterprise that do allocate income to another entity and also have a direct controlling interest in at least one other entity are used as seed entities and the process is run again. The first pass builds enterprises for non-pass-through owners such as individuals and corporations. The second pass builds the enterprises of partnerships that are not controlled by an individual partner.

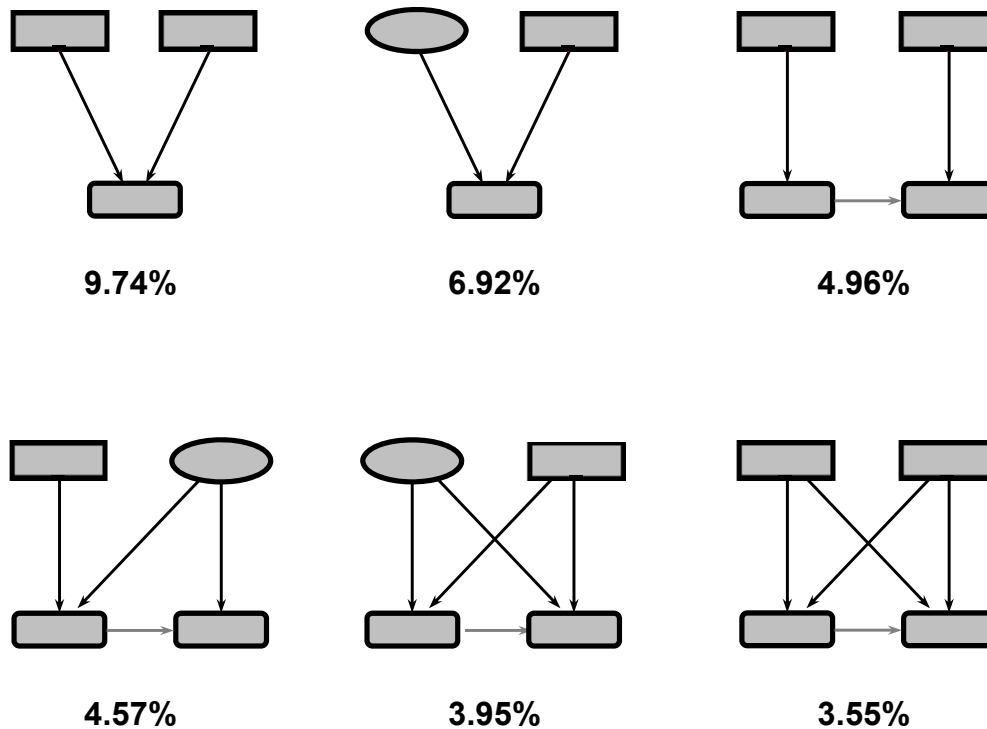
To accomplish this enterprise build it seemed logical to identify the seed entities, place them into an array and process them through a loop one at a time. While this method functioned well, it was inefficient and was estimated to take months to complete. This row-by-row processing is a common approach taken by programmers moving into database applications and is referred to as “slow-by-slow.” The more efficient approach is to process all seed entities at once. The seed entities are identified in a sub-query (grouped by a unique enterprise number) and all controlled entities identified in the primary query are assigned the associated enterprise number. The query is rerun until no additional entities are assigned to an enterprise. In actual application, this recursive query runs 10 or 11 times before exhausting linkages. This approach completes in a matter of hours—substantially more efficient than the row-by-row approach.

Results

For Tax Year 2008, the above methodology produced 1,060,493 enterprises consisting of 4,737,064 entities. Table 1 summarizes this population by the number of entities within each enterprise compared to the number of tiers deep. The vast majority of enterprises, 95.4%, have 10 or fewer entities and extend only 2 or 3 tiers deep. As with many distributions of financial data, this high concentration of enterprises in smaller amounts is expected. These smaller enterprises represent simple business structures where the assets of the business are held in a separate legal entity from the operating entity. An exploration of these smaller enterprises revealed the six structures in Figure 9 that comprise one-third of all enterprises. The specific attributes of the entities and linkages are not considered for this grouping. For example no distinction is made regarding an entity’s asset or income level nor the positive or negative amount of linkages.

TABLE 1. Total Population Enterprise Summary Statistics TY2008 (source: yK1 September, 2010)

Entity Range	Data	Tiers										Grand Total	
		2	3	4	5	6	7	8	9	10	11		
a. 5 or fewer Returns	Enterprises	611,938	295,298	11,023	265								918,524
	Average Entities	3	4	4	5								3.6
b. 6 to 10 Returns	Enterprises	40,642	63,839	10,237	1,238	120	11	1					116,088
	Average Entities	7	7	7	8	8	9	10					7.0
c. 11 to 25 Returns	Enterprises	5,516	10,902	3,844	1,000	172	24	10	2				21,470
	Average Entities	14	15	15	16	17	17	21	18				14.7
d. 26 to 50 Returns	Enterprises	525	1,394	766	260	82	19	6	1				3,053
	Average Entities	34	33	34	34	35	36	38	31				33.7
e. 51 to 100 Returns	Enterprises	107	323	294	117	36	16	3	2	1	1		900
	Average Entities	68	67	74	67	72	69	75	56	53	74		69.5
f. 101 to 500 Returns	Enterprises	38	103	135	96	29	17	1			1		420
	Average Entities	154	159	176	185	212	274	141			349		178.6
g. 501 or more Returns	Enterprises		4	3	10	12	5	3	1				38
	Average Entities		786	634	1,248	1,317	1,035	771	2,135				1,130.1
Total Enterprises		658,766	371,863	26,302	2,986	451	92	24	6	1	2		1,060,493
Total Average Entities		3.7	5.2	9.7	24.6	69.4	131.6	130.3	385.3	53.0	211.5		4.5
Percent of Total Enterprises													
		95.40%	2.16%										
		1.78%	0.66%										

Figure 9. Common Enterprise Structures

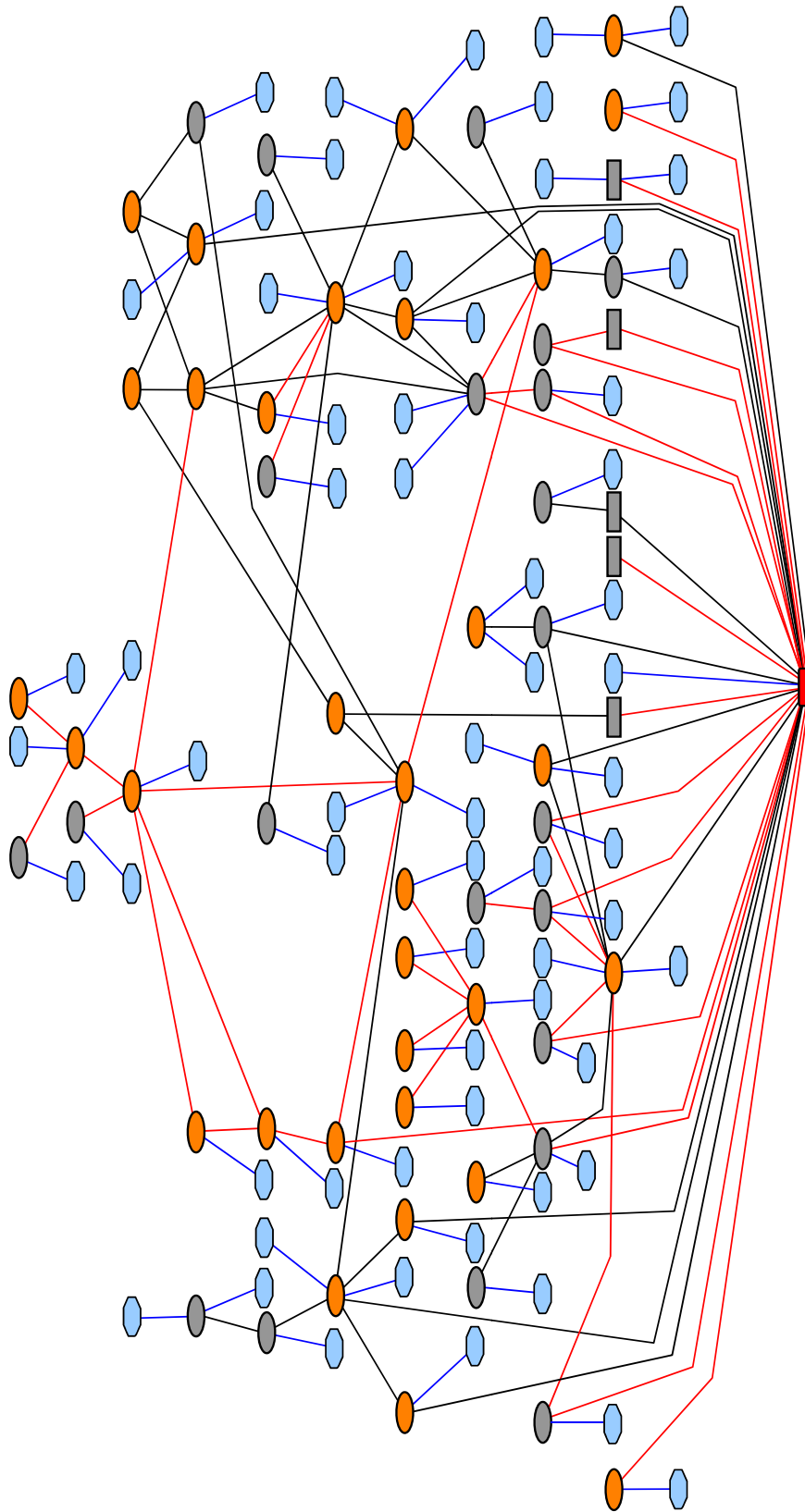
Appendix A presents a number of tables stratifying the enterprise population by various attributes. Some notable highlights from these tables include:

- About 50,000 of the 1 million enterprises belong to an owner in the Large Business & International Division, (Table 2).
- The Real Estate Industry dominates enterprises just as it dominates partnerships in general, (Table 3).
- Although enterprises were assigned the NAICS Industry Code most prevalent on the entities within the enterprise, usually less than half of the returns shared that NAICS sector, (Table 3).
- About 20% of the enterprises contained either an initial year return or a final year return, (Table 5).
- Fifty percent or more of the returns in an enterprise were usually prepared by the same preparer, (Table 6).
- Enterprises usually have very few investors other than the controlling owner. Fewer than 60,000 enterprises had more than ten other investors, (Table 7).
- Over 900,000 of the 1 million enterprises are controlled by an individual, (Table 9).

Large Enterprises

While few enterprises contain more than 10 entities, a few are quite large. In 2008 the enterprise with the largest number of entities had 4,680 entities spanning 6 tiers. Typically, one or two entities are used to gain an indirect controlling interest in another entity; however, in an extreme example an enterprise owner used hundreds of entities to establish a controlling interest in other entities. The next few figures show the investment structure of a number of the larger enterprises.

FIGURE 10. 74 Entities, 11 Tiers Deep Controlled by a High-Income Individual



Enterprise Summary Data

A number of summary metrics have been gathered for each enterprise. Most of these are descriptive counts of specific attributes, such as the number of foreign entities included in the enterprise or the number of tiers deep the enterprise extends. Some financial data has been collected—like the K-1 allocations received from entities outside the enterprise and the K-1 allocations between enterprise members. However, a significant barrier exists in gathering meaningful quantitative financial data: duplication. As entity structures are tiered, their representation of one entity's operational assets becomes an investment asset of the tier below them. Depending on the level of direct ownership and the accounting methods employed, there can be no duplication in enterprise asset figures all the way to complete duplication. Accounting for inter-company sales is even harder. For example, in our initially developed enterprise in Figure 7, it is impossible to tell how much of the sales of Partnership "G" were made to Subchapter S Corporation "C". These intercompany transactions need to be accounted for to develop a picture of the enterprise's economic activity with the outside world. Tax return data is insufficient to employ a traditional consolidated financial statement approach. An alternative estimate needs to be developed and this is an area of future research.

Future Research

Many other challenges remain in this area. Some broad research questions that remain open include:

- What is the best way to describe enterprise structures?
- Aggregation methods for data: How can the economic activity of an enterprise best be represented?
- Risk Assessment: What is the tax compliance risk of an entire enterprise structure, and how much of that risk is associated with the way the enterprise is structured compared to the compliance risk of the individual entities?
- Can techniques be developed to identify what entity or small group of entities comprise the operational center of an enterprise?
- Develop other heuristics of relationship and control, including name similarity analysis and familial relationships.
- Boundary Refinement; merging overlapping enterprises.
- Enterprise Profile: What does the population of enterprises look like?

Conclusion

The methodology outlined in this paper has proven to be an interesting first step in looking at the economic operation controlled by a single taxpayer. It has given the IRS the ability to see the scope and potential complexity of these controlled structures. However, extensive work remains in this area to achieve operationally useful information.

Appendix A

Supplemental Tables

TABLE 2. Number of Enterprises by Enterprise Owner Type,* Number of Entities, and Assets

Enterprise Owner Type	Grand Total Number of Enterprises	Number of Entities in Enterprise				Enterprise Assets		
		5 or fewer	6 to 10	11 to 25	26 or more	< \$1M	\$1M to < \$10M	≥ \$10M
LB&I Owner	49,944	32,596	9,561	5,485	2,302	1,637	4,483	43,824
Corporation	23,024	16,337	3,350	2,170	1,167	1	2	23,021
Regular 1120 Filer	20,462	14,277	3,086	2,013	1,086	1	2	20,459
Other 1120 Filer	2,543	2,054	261	150	78			2,543
Subsidiary	19	6	3	7	3			19
Individual	16,305	7,634	5,112	2,655	904	1,630	4,477	10,198
HIHW Tier 1 - TPI ≥ \$30M	1,805	640	600	381	184	101	292	1,412
HIHW Tier 2 - TPI \$5M to < \$30M	14,500	6,994	4,512	2,274	720	1,529	4,185	8,786
Uncontrolled Flow-Through	9,965	8,125	1,000	623	217	5	4	9,956
Partnership	7,975	6,357	862	556	200	4	4	7,967
S-Corporation	1,979	1,762	137	64	16	1		1,978
Trust	11	6	1	3	1			11
Form 990 Filer (TEGE)	412	320	63	21	8			412
Not a yK1 Filer	238	180	36	16	6	1		237
SB/SE Owner	1,010,555	885,932	106,529	15,985	2,109	618,894	322,741	68,920
Corporation	37,093	35,508	1,079	335	171	15,887	17,410	3,796
Regular 1120 Filer	30,696	29,734	766	160	36	13,623	15,067	2,006
Other 1120 Filer	6,313	5,760	292	156	105	2,205	2,321	1,787
Subsidiary	84	14	21	19	30	59	22	3
Individual	906,371	790,323	100,579	14,135	1,334	581,145	276,280	48,946
HIHW Tier 3 - TPI \$1M to < \$5M	83,507	53,516	22,387	6,696	908	16,806	42,625	24,076
HIHW Tier 4 - TPI \$200K to < \$1M	326,839	271,427	49,520	5,636	256	167,683	140,839	18,317
Non-HIHW Individual	452,190	425,050	25,772	1,301	67	365,706	82,121	4,363
TPI Unknown	43,835	40,330	2,900	502	103	30,950	10,695	2,190
Uncontrolled Flow-Through	45,664	43,076	1,846	615	127	13,947	22,018	9,699
Partnership	33,493	32,117	979	328	69	10,211	16,316	6,966
S-Corporation	6,339	6,198	108	27	6	2,301	3,230	808
Trust	5,832	4,761	759	260	52	1,435	2,472	1,925
Form 990 Filer (TEGE)	230	199	23	6	2	15	116	99
Not a yK1 Filer	21,197	16,826	3,002	894	475	7,900	6,917	6,380
Grand Total	1,060,499	918,528	116,090	21,470	4,411	620,531	327,224	112,744

* LB&I: Large Business and International Operating Division of the IRS

SB/SE: Small Business / Self-Employed Operating Division of the IRS

HIHW: High-Income High-Wealth

TPI: Total Positive Income

TABLE 3. Number of Enterprises by Dominant Industry Sector and Return Concentration

Dominant Industry Sector	Percentage of Returns in Dominant Sector					Grand Total
	100%	75% to < 100%	50% to < 75%	< 50%	Not Determined	
11. Agriculture, Forestry, Fishing and Hunting	2,311	1,124	9,481	2,805	1	15,722
21. Mining, Quarrying, and Oil and Gas Extraction	1,558	438	3,017	1,626		6,639
22. Utilities	279	36	259	137		711
23. Construction	4,831	2,072	29,254	10,746		46,903
31-33. Manufacturing	4,929	233	5,673	5,702		16,537
42. Wholesale Trade	3,302	446	8,814	7,579		20,141
44-45. Retail Trade	3,434	1,824	21,677	22,887		49,822
48-49. Transportation and Warehousing	1,535	496	6,665	8,427		17,123
51. Information	2,007	389	3,864	3,771		10,031
52. Finance and Insurance	12,925	2,694	22,344	19,336		57,299
53. Real Estate and Rental and Leasing	38,803	23,412	135,328	175,782		373,325
54. Professional, Scientific, and Technical Services	6,298	1,432	34,714	79,944	5	122,393
55. Management of Companies and Enterprises	5,825	95	4,671	8,310		18,901
56. Administrative & Support and Waste Management & Remediation Services	1,085	264	6,196	22,121		29,666
61. Educational Services	345	50	1,049	4,068	66	5,578
62. Health Care and Social Assistance	3,797	1,381	18,577	41,635	30	65,420
71. Arts, Entertainment, and Recreation	1,096	502	5,932	16,786	11	24,327
72. Accommodation and Food Services	2,649	2,323	19,418	35,235		59,625
81. Other Services (except Public Administration)	1,840	573	13,038	51,173	62	66,686
92. Public Administration	8		6	45		59
XX. Sector Unknown	2,751	421	11,406	37,598	1,409	53,585
Grand Total	101,608	40,205	361,383	555,713	1,584	1,060,493

TABLE 4. Number of Enterprises by Percentage of Enterprise Tiered and by Tier Depth

Percentage of Entities Tiered	Number of Tiers				Grand Total
	2	3	4	5 or more	
Less than 50%	394,723	12,154	383	50	407,310
50% to < 90%	132,847	160,237	7,209	780	301,073
90% or more	131,196	199,477	18,710	2,733	352,116
Grand Total	658,766	371,868	26,302	3,563	1,060,499

TABLE 5. Number of Enterprises by Initial/Final Return Status and Number of Entities in Enterprise

	Number of Entities in Enterprise				Grand Total
	5 or fewer	6 to 10	11 to 25	26 or more	
Initial or Final Returns Present	171,367	32,750	8,996	2,797	215,910
No Initial or Final Returns	747,161	83,340	12,474	1,614	844,589
Grand Total	918,528	116,090	21,470	4,411	1,060,499

TABLE 6. Number of Enterprises by Preparer Concentration and Number of Entities in Enterprise

Percentage of Returns in Enterprise Prepared by Same Preparer	Number of Entities in Enterprise				Grand Total
	5 or fewer	6 to 10	11 to 25	26 or more	
100%	268,120	13,809	2,313	240	284,482
75% to < 100%	206,917	40,004	8,772	1,324	257,017
50% to < 75%	286,333	40,017	5,057	692	332,099
< 50%	93,831	17,047	4,145	1,760	116,783
No returns filed	523	60	48	48	679
(blank)	62,804	5,153	1,135	347	69,439
Grand Total	918,528	116,090	21,470	4,411	1,060,499

TABLE 7. Number of Enterprises by Number of Minority Investors and Number of Entities in Enterprise

Number of K-1's Issued to "Minority" Investors	Number of Entities in Enterprise				Grand Total
	5 or fewer	6 to 10	11 to 25	26 or more	
26 or more	10,958	3,514	4,207	2,723	21,402
11 to 25	19,924	10,132	7,846	589	38,491
1 to 10	590,719	84,416	7,444	746	683,325
No other investors	296,927	18,028	1,973	353	317,281
Grand Total	918,528	116,090	21,470	4,411	1,060,499

TABLE 8. Number of Enterprises by Allocation Amount and Number of Entities in Enterprise

Absolute Value of Allocations in Enterprise	Number of Entities in Enterprise				Grand Total
	5 or fewer	6 to 10	11 to 25	26 or more	
\$250K or more	177,291	63,789	17,899	3,901	262,880
< \$250K	741,237	52,301	3,571	510	797,619
Grand Total	918,528	116,090	21,470	4,411	1,060,499

TABLE 9. Number of Enterprises by Asset Range and Owner Type

Enterprise Assets	Enterprise Owner Type					Grand Total
	Corporation	Individual	Uncontrolled Flow-Thru	TEGE 990 Filer	Not a yK1 Filer	
≥ \$10M	26,817	59,144	19,655	511	6,617	112,744
\$1M to < \$10M	17,412	280,757	22,022	116	6,917	327,224
< \$1M	15,888	582,775	13,952	15	7,901	620,531
Grand Total	60,117	922,676	55,629	642	21,435	1,060,499