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THE COLLOCATION OF HIGH FREQUENCY WORDS

IN ECONOMIC AND ACADEMIC CORPORA

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**Abstract**

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It has been argued that a word is best learned from its context, showing the importance of learning various lexical combinations occurring in sentences. Several major variations of lexical combination can be identifies, each exhibiting varying degrees of cohesiveness. One of the famous lexical combinations is called collocations. Collocation is defined as the co-occurrence of words in a text. The term ‘collocation’ is generally used in discussing the nature of lexis and its relation to grammar (Nation, 2001). Even though lexis is usually contrasted with grammar, they sometimes have a close relationship with each other.

This study investigates the pattern of collocation of the high frequency words occurring in two corpora, economics and academic corpora. The collocational behavior of these words in both economics and academic texts is compared. It was found that the difference in the richness of collocations in the two corpora is simply due to the difference in the text types of these two corpora. In the economics corpus which consists of texts on one topic, there is more opportunity for significant collocations to be repeated. The chance for the same collocates to occur frequently is greater than in the Academic corpus. In the Academic corpus which consists of many differen texts, there is smaller chance for the same collocates to occur repeatedly. There are very few collocates in the Academic corpus which do not occur in the Economics corpus. However, only a small number of collocates occur very frequently in both corpora.

Keywords: Collocate, collocation, corpus, economics, academic, high frequency words

INTRODUCTION

Teaching English for specific purposes should be designed carefully in a way that it can meet the students’ need. This present study was carried out based on the idea that there is a need for vocabulary control in language teaching (Nation, 2010: 73). It looks at the features of words in a text book which is widely used internationally to teach economics and seeks to find the most important words needed in order to read the text book.

This study attempts to investigate the nature of collocation occurring in economics vocabulary by analyzing a widely used economics text book, Parkin’s *Microeconomics*, in terms of the vocabulary used. The study is based on computer corpus analysis including word frequency counts. There has been very little research similar to this where vocabulary in a text is analyzed and identified for the purpose of ESP teaching. The aim of this study is to find the collocational behavior of the high frequency words in both economics and academic texts?

**What is Collocation?**

Collocation is defined as the co-occurrence of words in a text (Sinclair, 1991: 170). The term ‘collocation’ is generally used in discussing the nature of lexis and its relation to grammar (Nation, 2001). Even though lexis is usually contrasted with grammar, they sometimes have a close relationship with each other.

A word is meaningful whenever it is seen in connection with other words in a text. Certain words occur together significantly. This co-occurrence is called collocation. Take, for example, the phrase ‘low price’ which is used so frequently in an economics text that it springs readily to mind; it is psychologically salient as a fixed phrase in English. Thus, we call it a **fixed combination**, **recurrent combination** or **collocation** (Benson et al., 1986). *Thank* collocates with *you* as in *thank you*. The word *lean* collocates significantly with the word *meat*. ‘A significant collocation is one in which the two items co-occur more frequently and regularly than could be predicted on the basis of their respective frequency and the length of the text under consideration’ (Martin et al., 1983: 84). The word *thank*, in the above example, occurs with the word *you* more frequently than, for example, the word *her* or *him* as in *thank her* or *thank him*. Therefore, the latter is not considered a collocation.

Several collocational patterns occur as fixed combinations. The items may co-occur simply because the combination reflects a common real world state of affairs (Gairns and Redman, 1986). For example, *pass* and *salt* collocate significantly as in ‘Please pass the salt!’, because people often want other people to pass them salt. The following is an example of some fixed combinations in collocation:

* *cats and dogs*: as in *It’s raining cats and dogs*, but not *dogs and cats*;
* *after all*, but not *before all*;
* *mother tongue*, but not *father tongue*; etc.
* *the fast train,* but not *the quick train*
* *fast food,* but not *quick food*
* *A quick shower,* but not *a fast shower*
* *A quick meal,* but not *a fast meal*

The examples above indicate that the words with their company are linked together quite closely. The words in these fixed pairs sometimes have a different meaning from their individual meaning. We can notice the word *of* and *course* as in *of course* have their own individual meaning. The word *of* and *course* in this context are different from the word*of* and *course* in other contexts, such as *instead of*, *way of life*, *an English course*, *course work*, etc.

 Trimble (1985) considers that noun compounds are a major source of difficulty. Noun compounds can be defined as ‘two or more nouns plus necessary adjectives (and less often verbs and adverbs) that together make up a single concept; that is, the total expresses a “single noun” idea (Trimble, 1985: 130 – 131). In economics text, many noun compounds are found such as *maturity structure*, *net present value*, *price-earning ratio*, and so on. These collocations may be a major source of difficulty and for this reason these compounds deserve special attention.

 The terms **node**, **collocate**, and **span** will often be used in this discussion. ‘A node is the lexical item whose collocational pattern is being investigated. A collocate is any lexical item which co-occurs with the node within specified co-text. A span is the context within which the collocates are said to occur. Span positions of collocates are numbered according to their distance from the node’ (Martin et al., 1983: 84). The word *low*, as in *low price*, is a word whose collocational pattern is being investigated; and *price* is a word that co-occurs with the node and is therefore called a collocate. In this case, the collocate *price* occurs at span position N+1 of the node *low*.

 However, node and collocate can alternatively be used depending on what word is being investigated and what word is appearing as a co-occurrence of the word. If, for instance, we investigate the collocational pattern of the word *price* and notice that the word *low* co-occurs significantly with it, then *price* is the node and *low* is the collocate with span position of N-1.

Lexical Items in EAP

In general English vocabulary, words are usually classified into high and low frequency. The high-frequency words are typically small in number but occur very frequently in a wide range of texts. The low-frequency words are many in number and occur infrequently with a narrow range. For general purposes the words in the first 2,000 words of General Service List of English Words, called GSL (West, 1953), are considered as high-frequency words. All other words are considered as low-frequency words.

In EAP, low-frequency words in general English may have a very high frequency in a specialized field, along with a special meaning. These may be termed technical vocabulary, although as we shall see later in this study, this group of words is not easy to define. Some researchers have shown that technical words do not usually cause great difficulty for second language learners (Ghadessy, 1979).

**METODOLOGY**

To investigate the features of words and language use in a particular field needs a large amount of data. A computerized corpus can provide such data. As previously mentioned, this study deals with identifying the features of the vocabulary of economics and investigates the uniqueness of this vocabulary in comparison with other fields. Therefore, two corpora, economics and general academic, were compared in this study.

This study had to decide which particular corpora would be used. After some consideration, a widely used introduction to economics which is used as a textbook in many universities was chosen. It was *Microeconomics* by Michael Parkin. A corpus of a similar size from general academic vocabulary was made by selecting section J (written academic English) from the Lancaster-Oslo-Bergen (LOB) corpus and the Wellington corpus (VUW). The selection of section J, learned and scientific writing, was done to provide a sample of a wide range of the vocabulary of academic English.

**RESULT**

As it has been mentioned, the study looks at collocation the high frequency words. It compares the behavior of three high-frequency words in both economic and academic corpora. It examines a word—*price*—that is very frequent in both Economic corpus (EC) and Academic corpus (AC) , but which has the statistical features of a technical word in that it is of extremely high frequency in the specialized corpus, EC. The purpose of the comparison is to see if its high occurrence in the specialized corpus is reflected by having a specialized group of collocates.

The next word examined are *increase*. This word occurs very frequently in the frequency lists of EC and AC. The purpose of the comparison is to see if the similarity of rank hides a different set of collocations.

The Collocations of *Price*

*Price* is one of the most frequent words in Economics corpus. It occurs 3080 times and is in the 10 most frequent words. In Academic corpus, even though the word belongs in the first 500-word level, this word has a much lower frequency of occurrence. It occurs 92 times in AC. Table 1 shows that the stem *price* occurs most frequently in both corpora, followed by *prices* and *pricing*. The data show that the word *price* is used in EC mainly as a noun preceded by adjectives and adjectival nouns. There was only one verb occurrence, namely *priced* (Table 2), as in ‘*With players typically priced at $1,000 and discs selling for more than $20, sales did begin as a trickle*’ (Parkin, 1990: 92).

Table 1: The number of forms of the lemma *price* occurring in EC and AC

|  |  |  |
| --- | --- | --- |
| Type | EC | AC |
| Occurrences | % | Occurrences | % |
| Price | 2364 | 83.64 | 54 | 58.70 |
| priced | 1 | 0.03 | - | - |
| prices | 484 | 15.36 | 34 | 36.96 |
| pricing | 30 | 2.09 | 4 | 4.34 |
| Total | 3149 | 100.00 | 92 | 100.00 |

In AC, 63 occurrences of *price* (68.48%) are used as nouns in the text including the present participle *–ing* as in *competitive pricing*. The remaining 29 items (31.52%) out of the total 92 tokens function as adjectives including three *–ing* items: *pricing decision*, *pricing power*, and *pricing controls*.

Table 2: The grammatical functions of *price* in EC and AC

|  |  |  |
| --- | --- | --- |
| Part of Speech | EC | AC |
| Total | % | Total | % |
| Nouns | 2856 | 90.70 | 63 | 68.48 |
| Verbs | 1 | 0.03 | - | - |
| Adjectives | 292 | 9.27 | 29 | 31.52 |
| Total | 3149 | 100.00 | 92 | 100.00 |

Right-Hand Collocations

Table 3 contains those words which immediately follow *price* in EC and AC. This shows that *price* in EC is mostly used in noun phrases such as *the price of soda*, *the prices of goods*, *the price of movies*, etc.

Table 3: The rank order of right-hand collocations with *price*

| Collocate | Tokens |
| --- | --- |
| EC | AC |
| price/s of | 753 | 9 |
| price is | 186 | - |
| price/s change/s | 77 | 2 |
| price/s and quantity/ies | 69 | - |
| price discrimination | 67 | - |
| price rise/s (11/55) | 66 | - |
| price fall/ing/s (6/1/49) | 56 | - |
| price and the quantity | 49 | - |
| price at which | 38 | - |
| price for | 36 | - |
| price elasticity(ies) | 35 | - |
| price monopoly | 35 | - |
| price increase/s (7/26) | 33 | - |
| price will/would (23/8) | 31 | - |
| price discriminate/s/ing (22/5/3) | 30 | - |
| price elasticity of demand | 30 | - |
| price to | 30 | - |
| price equal | 27 | - |
| price on | 16 | - |
| price-earning/s ratio (1/15) | 16 | - |
| price change/s/d (11/1/4) (verbs) | 16 | - |
| pricing rule | 15 | - |
| price in | 15 | - |
| price and output | 15 | - |
| price taker/s (13/2) | 15 | - |
| price war/s (3/12) | 15 | - |
| price determination | 14 | 2 |
| price fluctuations | 11 | - |
| price effect | 10 | - |
| price varies | 10 | - |
| price and income/s (5/5) | 10 | - |
| price control/s (5/6) | - | 11 |
| price level | - | 7 |
| price variable | - | 2 |

The figures in brackets show the number of tokens for each collocates, e.g. *price rise* occurs 11 times and *price rises* occurs 55 times making a total of 66 occurrences. The collocation ‘*is’* indicates that the word *price* is used as a noun functioning as a subject. The words that follow this construction are mostly items like *bushel*, *tape*, *great*, *high*, *low*, *above*, *below*, etc., as in *price is $3 a bushel*, *price is $3 a tape*, *price is high*, etc. The word *is* also occurs in passive constructions frequently followed by verbs such as *reached*, *regulated*, *determined*, *shown*, etc., in sentences like *price is determined by actual supply and demand*. In this case, *determined* has the highest occurrence (8).

So far we have looked mainly at immediate collocations. Let us now look at those occurring within a 5-word span to the right of *price* (N+1 to N+5). The frequencies of the words, for example *change*, *quantity*, *fall*, *increase*, are 77, 69, 56, 33, respectively in Table 3, but in Table 4, which considers a wider span, their frequencies increase to 83, 151, 78, and 53. The words *goods*, *tape*, and *movies*, which occur with less than 10 occurrences, also occur much more frequently after *price* in the wider span, i.e. 121, 57, and 39 times. Here are some examples of their use:

* *prices are influenced by technological change*
* *the price and quantity traded in a market*
* *the price and the quantity of train*
* *the prices of goods and services*
* *a price of $3 a tape*
* *The price of movies*
* etc.

Table 4. The rank order of collocation of *price* in span positions N+1 to N+5 in EC where each collocate occurs in more than one position

| **Collocate** | **Tokens** | **Collocate** | **Tokens** |
| --- | --- | --- | --- |
| quantity/ies | 151 | Traded | 30 |
| good (s) | 121 | Labour | 29 |
| change (s) | 83 | Capital | 26 |
| fall (s) | 78 | Substitute | 23 |
| discrimination | 67 | Soda | 21 |
| tape/s | 57 | Determination | 21 |
| increase | 53 | Income | 19 |
| demand/demanded | 40 | Output | 19 |
| monopoly | 39 | Bushel | 18 |
| movies | 39 | Cost | 18 |
| discriminate | 34 | Complement | 17 |
| resources | 32 | Marginal | 12 |
| Equal | 31 | sold (sell) | 10 |

Left-Hand Collocations

The highest-frequency content word occurring before *price* is *high* with its comparative*higher* and superlative *highest*. This word is typical of economics vocabulary. *Low* is also a frequent collocate.

* *For any resource, there is a high price at which it does not pay anyone to use the resource.*
* *Why does a higher price lead to a greater quantity supplied of a good?*
* *What is the highest price that the consumers are willing to pay?*
* *When the demand is higher than expected, the price turns out to be higher that it was forecasted to be.*
* *When the demand is lower than expected, the price turns out to be lower than it was forecasted to be.*

Table 5: The rank order of left-hand collocations with *price*

| Collocate | Tokens |
| --- | --- |
| EC | AC |
| (the price) | 1015 | 17 |
| if the price | 106 | - |
| a high/er/st price/s | 97 | 7 |
| its price | 96 | - |
| when the price | 86 | - |
| at a price | 83 | - |
| a change/s in price(s) | 78 | - |
| market price/s (68/7) | 75 | - |
| factor price/s (33/27) | 60 | - |
| low/lower/est price | 57 | 3 |
| equilibrium price | 45 | - |
| single-price | 44 | - |
| future price/s (29/14) | 43 | - |
| change/s in the price | 39 | - |
| relative price | 37 | - |
| as the price | 32 | - |
| input prices | 30 | - |
| on price/s (10/7) | 27 | - |
| a fall in the price | 26 | - |
| each price | 24 | - |
| to price | 23 | - |
| cost pricing | 22 | - |

Table 6 lists recurring content-word collocates in a wider span position in EC. Thewords *high*, *low*, *market*, *factor*, and *equilibrium*, are still among the most frequent collocates. The collocates *monopoly*, *supply*, and *margin*, are very-frequent left collocates in different span positions. No high-frequency content-word collocates were found in AC.

Table 6: The rank order of the collocations of *price* in span positions N-1 and N-5 in EC where each collocate occurs in more than one position

| Collocate | Token | Collocate | Token |
| --- | --- | --- | --- |
| high (er/est) | 132 | Average | 22 |
| low (er/est) | 97 | Expected | 22 |
| Market | 75 | Raise | 21 |
| Factor | 60 | Cost | 20 |
| equilibrium | 45 | Divided | 16 |
| Single | 44 | Given | 15 |
| Future | 43 | Asset | 14 |
| Each | 42 | Monopoly | 14 |
| relative | 41 | supply/ied | 13 |
| Equal | 36 | Marginal | 12 |
| quantity | 24 | Small | 11 |
| Actual | 22 | Possible | 10 |

Comparing the collocations of *price* in EC and AC, the similar most-frequent collocates are *of* and *change* in the right-hand collocations, and *the*, *high* and *low* in the left-hand collocations. All together, there are 9 words in the left and 4 in the right collocation in both corpora:

left : *falling*, *high*, *increase*, *market*, *oil*, *rising*, *set*, *when*, *which*

right : *change*, *determination*, *increase*, *variable*

The Collocations of *Increase*

The word *increase* is the hundredth most frequent word in both EC and AC. In the two corpora, the frequency of occurrence is different, 991 tokens in EC and 260 tokens in AC. Like most other content words, this word appears with its derived forms serving a variety of functions. Table 7 shows the number of word-forms appearing in EC and AC

Table 7. The number of forms of the lemma *increase* occurring in EC and AC

|  |  |  |
| --- | --- | --- |
| Type | EC | AC |
| Occurrences | % | Occurrences | % |
| Increase | 402 | 40.57 | 97 | 37.31 |
| Increased | 112 | 11.30 | 70 | 26.92 |
| Increases | 364 | 36.37 | 33 | 12.69 |
| increasing | 113 | 11.4 | 60 | 23.08 |
| Total | 991 | 100.00 | 260 | 100.00 |

Table 8 shows the proportions of functions of *increase* in EC and AC. In EC it was found that of the 991 occurrence, 713 items (71.95%) functioned as nouns, 621 of which were in the base-form *increase*, and 92 items were in the *–ing* form or gerund *increasing*. The second rank after nouns is verbs. The verb *increase* occurs 241 times in EC or 24.32% of the total tokens. This consists of 229 base-forms and *–ed* forms and 12 *–ing* forms.

* *average product is increasing*
* *white workers were increasing dramatically*
* *if the demand had increased slightly more than shown*
* *The price has increased from*
* *its own budget should be increased*
* etc.
* Table 8: The grammatical functions of *increase* in EC and AC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Part of speech | Tokens | Tokens (*–ing*) | EC | AC |
| Eco | Aca | Eco | Aca | Total | % | Total | % |
| Adjectives | 28 | 17 | 9 | 36 | 37 | 3.73 | 53 | 20.38 |
| Verbs | 229 | 54 | 12 | 9 | 241 | 24.32 | 63 | 24.23 |
| Nouns | 621 | 129 | 92 | 15 | 713 | 71.95 | 144 | 55.39 |
| Total |  | 991 | 100 | 260 | 100 |

*Increase* as an adjective consists of the *–ed* form and *–ing* form, *increased* (28 items) and *increasing* (9 items). The proportion of this type is very low, only 3.73%, that is only 37 items out of the total 991 items. See the following examples:

* *to an increased amount of radiation*
* *Increased rural incomes brought an expanding rural industrial sector*
* *the increasedquantity sold results in revenue gain*
* *An increasing number of households are choosing the egalitarian*

*Increase* in AC occurs 260 times in the collocational list. Table 5.11 shows the frequency of parts of speech in the list. As in EC, the samples are dominated by nouns comprising 144 items (55.39%), out of the 260 samples. This includes 129 base-forms*increase*, and 15 *–ing* forms*increasing*. However, this proportion is not as high as that in EC. The proportions of adjectives and adverbs in AC, unlike those in EC, are almost the same, 20.38% (53 items) and 24.23% (63 items). The adjectives consist of 17 *–ed*forms and 36 *–ing*forms. These words are used to modify nouns, e.g.:

* *There is an increased liability to the development of diabetes.*
* *They also noted the increasing number of rolled coral in the upper beds*

Left Collocations

Table 9 shows the rank-order list of immediate left-hand collocations of *increase* in EC and AC with their occurrences ranging from 9 to 46 in EC and 8 to 16 in AC. It also shows that three function words dominate the top rank list in EC, *to* (infinitive), *have*, and *the* with frequencies of occurrence of 46, 32, and 31. Among the top content words, *price* and *income* are included, with 35 and 30 occurrences (see Table 9). This indicates that the word *increase*appears mostly as a noun or a verb in both corpora (see Table 8). Most of the verbs *increase* are marked by the infinitive *to*. Another verb marker is *have* with its inflected forms, *has* and *had*.

 The next most frequent collocates preceding *increase* in EC are content words—*supply*, *output*, *percentage*, and *unit*—with frequencies of occurrence of 24, 16, 14, 13, and 13, whilst the verb *lead* occurs 16 times before *increase* in span position N-3 as in *to lead to an increase*.

Table 9: The rank-order list of immediate left-hand collocations with *increase* in EC and AC

|  |  |
| --- | --- |
| Collocate | Tokens |
| EC | AC |
| to increase | 46 | 15 |
| price/s increase/s (9/26) | 35 | - |
| have increased | 32 | 8 |
| the increase | 31 | 11 |
| income increase/s (3/27) | 30 | - |
| (an increase) | 27 | 15 |
| supply increases/ied (14/10) | 24 | - |
| leads /ing to an increase in (8/8) | 16 | - |
| output increases | 14 | - |
| percentage increase in | 13 | - |
| one-unit increase in | 13 | - |
| can/could increase (11/1) | 12 | - |
| result/s in an increase in (2/9) | 11 | - |
| rate increases | 11 | - |
| and increases | 10 | - |
| a/the large increase (8/1) | 9 | - |
| will increase | 9 | - |
| the quantity traded increases | 9 | - |
| rate/s of increase (1/15) | - | 16 |
| with increasing | - | 10 |
| an increased (price, tendency, etc.) | - | 9 |
| the increasing | - | 8 |

The following are some sentences exemplifying these collocates in EC:

* *When incomes increase, consumers demand more of most goods.*
* *When the price increases, the quantity supplied increases.*
* *Total cost (TC) increases as output increases.*
* *when the percentage increase in output exceeds the percentage increase in input*
* *the change in total product resulting from a one-unit increase in the variable input.*

(Note that the collocates before *increase* like this occur many times in the list)

Right-Hand Collocations of Increase

Table 10 shows that there were a small number of collocations of content words occurring after *increase* in span position N+1.

Table 10: The rank-order list of immediate right-hand collocations with increase in EC and AC with a frequency of 5 or more

|  |  |
| --- | --- |
| Collocate | Tokens |
| EC | AC |
| increase/s in | 224 | 61 |
| increase/s from | 33 | - |
| increase in the quantity | 31 | - |
| increase in demand | 30 | - |
| increases to | 21 | - |
| increase in the price/s of | 14 | - |
| increase their | 14 | - |
| increase in supply | 14 | - |
| increases as | 12 | - |
| increase output | 11 | - |
| increases the quantity | 11 | - |
| increases, the quantity | 11 | - |
| increase in the demand for | 10 | - |
| increases its | 10 | - |
| increase/ing of | - | 10 |
| increased by | - | 7 |
| increase with | - | 5 |

The following are examples of phrases containing some of those collocates in EC:

* *When labour increases from 1 to 2 workers*
* *The increase in the quantity demanded of coal would result*
* *An increase in demand for the industry’s production shifts the demand*
* *When supply increases to 18 billion bushels and the price falls to*
* *An increase in the price of hamburgers will produce*
* *The increase in supply lowers the price of tapes by*

Table 11: The rank-order list of collocations of *increase* in span positions N+1 to N+5 in EC and AC where each collocates occurs in more than one position

| Collocate | Tokens |
| --- | --- |
| EC | AC |
| quantity | 69 | - |
| demand /ed (59/10) | 69 | - |
| price | 40 | - |
| supply | 27 | - |
| consumption | 14 | - |
| income | 12 | - |
| inputs | 10 | - |
| revenue | 10 | - |
| production | 8 | - |
| product | 6 | - |
| cost | 5 | - |
| crime | - | 7 |

Table 10 lists the content words which occur in span positions N+1 to N+5. The right collocations of *increase* in AC consist of structural words such as *in*, *of*, *by*, and *with*. *In* and *of* dominate the occurrences, 61 and 10 times (see Table 9). There are only two words which occur frequently in span positions N+1 to N+5 in AC, i.e. *in* (61 times) and *crime* (7 times). Thus, *crime* is the most important content word in AC occurring in different span positions after *increase* (Table 11).

 Comparing the collocations of *increase* in both EC and AC, the former still shows many variations of collocational patterns compared with the latter. However, there are some words found to be the same collocates in EC and AC with a low frequency of occurrence. Unlike AC, there are some content words found in the right-hand collocations with *increase* in EC, such as *quantity*, *demand*, *price*, *supply*, *output*, *revenue*, etc. In AC, no significant collocation of content words was found. The frequent collocates are function words. *In* is a common collocate occurring after *increase* in both corpora, and *to*, *have*, and *the*are the most frequent left-hand collocates in both corpora. There is no similar frequent content-word collocate in both EC and AC. What is clear is that EC has much richer collocates compared with AC, but this is partly a result of the greater number of occurrences of *increase* in EC.

**Conclusion**

The difference in the richness of collocations in both corpora is simply due to the difference in the text types of both corpora. Being a text on one topic, Economics corpus has more opportunity for significant collocations to be repeated. The chance for the same collocates to occur frequently is greater than in Academic corpus. Academic corpus, consisting of many different texts, has a smaller chance for its collocates to occur repeatedly. There are very few collocates in Academic corpus which do not occur in Economics corpus. However, only a small number of collocates occur very frequently in both corpora.

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