

Priority areas of state regulation of the industry in the context of sustainable development

N Shmygol¹, O Galtsova², O Yelisyeyeva³, I Tarlopov³ and V Belozertsev³

¹ Department of Management, National University «Zaporizhzhia Polytechnic», 69000, Zaporizhzhia, 64 Zhukovsky str., Ukraine

² Department of National Economy, Marketing and International Economic Relations Classic Private University, 69000, Zaporizhzhia, 70 Zhukovsky str., Ukraine

³ Department of Statistics, Accounting and Economic Informatics, Oles Honchar Dnipro National University, 49000, Dnipro, Gagarin Aven., 72, Ukraine

E-mail: nadezdash@ua.fm

Abstract. In the article it is proved, that the economic development of any industry depends on the results of the economic activities of the enterprises that are part of it. Based on the available statistical data, we proposed a model for diagnosing the results of the mining industry and conducted a comparative analysis of the results of the study in the context of economic activities. Given the high integration of mining enterprises into the system of intersectoral relations, this problem cannot be solved within the framework of one industry. Therefore, it is proved that, taking into account the existing experience, it requires complex measures: accounts receivable are formed as a result of late payment for delivered products. The main consumers of the extractive industry are: the processing industry, the supply of electricity, gas, air conditioning and transport. They consume more than 87% of the products of this industry in the intermediate consumption market and are the most debtors; on the other hand, these regions are also the largest suppliers of raw materials, materials and semi-finished products for the extractive industry. Therefore, in the end, the accumulation of current accounts payable at the enterprises of the extractive industry for the delivered goods and services is the least desirable for them.

1. Introduction

The analysis of the current development of the Ukrainian economy indicates the exceptional role of the extractive industry in providing conditions for the rhythmic functioning and development of other sectors of the Ukrainian economy in the context of sustainable development, especially such as: production and distribution of electricity, gas and water; processing industry, transport and construction [1-3]. The implementation of the concept of sustainable development is associated with its appropriate provision at different levels of regulation. Structural elements of state regulation, in this case, should provide for full mutual coherence with each other, in order to maximize the useful result of managing the components of socio-economic development [4-5]. According to science and practice, the process of economic development faces a number of problems that take into account the sectoral and regional features of the functioning of economic systems. The problem of determining priority areas, in this case, tends to intensify and is more difficult to predict in the context of globalization and internationalization of the economic space [6-8].



Such objective circumstances necessitate the development and application of modern approaches to sustainable development at various levels of government regulation, the definition of priority areas, taking into account world experience, the generalization of which opens up new opportunities for solving major socio-economic problems [9-11]. Being focused on the intermediate consumption market, the extractive industry produces products that are used in further production as raw materials, materials and semi-finished products. Thus, creating conditions for ensuring its economic development is an extremely urgent task [12-13].

2. Analysis of the situation

Industry statistics, which includes the mining industry of Ukraine, keeps records for the following types of enterprises, such as: mining of hard coal and brown coal; extraction of crude oil and natural gas; mining of metal ores; other extractive industries.

The sustainable development of any industry depends on the results of the economic activities of the enterprises that are part of it.

Table 1 shows statistical data on the dynamics of the number of extractive industry enterprises and quarry development during 2017-2019 in the context of types of economic activity and size of enterprises.

Table 1. Dynamics of the number of extractive enterprises by their size and types of economic activity according to the data of 2017-2019.

Industry	Year	Number of enterprises, units.			
		Total	Big	Medium	Small
Mining, including:	2017	1918	54	304	1560
	2018	1408	31	233	1144
	2019	1485	27	243	1215
extraction of hard and brown coal	2017	399	35	89	275
	2018	103	13	44	46
	2019	157	9	67	81
extraction of crude oil and natural gas	2017	119	5	19	95
	2018	110	4	19	87
	2019	115	4	20	91
extraction of metal ores	2017	59	11	9	39
	2018	46	12	8	26
	2019	44	13	7	24
another mining industry	2017	1341	3	187	1151
	2018	1149	2	162	985
	2019	1169	1	149	1019

It should be noted that a significant number of enterprises are located in the territories of Donetsk and Luhansk regions. Since some areas of these regions are currently temporarily occupied, Table 1 shows that during 2017-2019, the mining industry of Ukraine lost a significant amount of its production potential. Thus, the reduction in the total number of enterprises was

$$(1485/1918 - 1) * 100\% = -22,6\%$$

The largest losses occurred among large enterprises of the extractive industry, their number decreased from 54 to 27 units, or by -50%; the number of medium-sized enterprises decreased by -20.1%, and small by - 22.1%.

If we consider the losses by types of economic activity, the worst situation was in the production of hard coal and brown coal: the total number of enterprises decreased by -60.7%, including at the expense of large enterprises by -74.3%.

In the second place are enterprises for the extraction of metal ores. Their number at the expense of medium and small enterprises decreased by -25.4%. However, this is the only type of activity where the number of large enterprises has grown from 11 to 13 units. Although the industrial production of crude oil and gas retained minimal losses in the total number of enterprises at the level of 3.4%, this happened, first of all, due to medium and small businesses; large enterprises reduced their presence by -20%. Other extractive industries also suffered losses at the level of -12.8%.

The considered trends had a negative impact on the entire extractive industry and the economy of Ukraine as a whole. Table 2 shows statistical data on the dynamics of the volumes of products sold by the enterprises of the industry during 2017-2019 in comparable prices of 2017.

Table 2. Dynamics of the volumes of sold products of the extractive industry for 2017-2019 in comparable prices, mln UAH.

Year	Mining industry, mln UAH	The volume of products sold at comparable prices, mln UAH.			
		Coal	Oil and gas	Metal ores	Other
2017	185031,8	62868,6	40237,6	68432,6	13493,0
2018	140037,6	24565,1	42386,1	61934,9	11151,6
2019	118660,8	21125,1	41442,7	46198,0	9895,1
Average annual growth rate,%	-19,9%	-42,0%	1,5%	-17,8%	-14,4%

As can be seen from Table 2, the average annual growth rate of products sold in the extractive industry at comparable prices was -19.9%. These changes occurred due to an annual reduction in: coal production by -42.0%; metal ores - -17.8%; other mining industry- -14.4%. Only the volume of sales of crude oil and natural gas had a positive annual growth rate of 1.5%. In such conditions, the development of a strategy to increase production efficiency should be based on the results of monitoring and diagnostics of the state of the mining industry, taking into account the types of economic activity [14-17].

3. Method

The state statistical reporting includes publicly available aggregated data on the balance sheet indicators of mining enterprises and the financial results of their economic activities in the context of sustainable development. The balance sheet asset is presented with information about the volumes of non-current and current assets, and current assets have the appropriate detail; the balance sheet liability contains information about equity, long-term and current liabilities, as well as with detailed details. Thus, based on the task and the available statistical data, we proposed a model for diagnosing the results of the mining industry and conducted a comparative analysis of the results of the study in the context of economic activities, the methodological foundations of which are shown in Fig. 1.

The first stage of the above methodological approach involves the selection and justification of a variety of economic indicators that comprehensively characterize the state of mining enterprises [18-21]. Let's denote them as $X = \{X_i\}$, $i = 1..n$. The selection of indicators was carried out taking into account the following restrictions:

- the set of averaged indicators should be calculated on the basis of statistical data that are publicly available, characterize the state of mining enterprises as fully as possible and contain the minimum number of indicators necessary for this;
- a set of indicators should reflect various aspects of the financial and economic condition of enterprises: liquidity and solvency-respectively, to assess the potential ability of industry enterprises to repay short-term and long-term liabilities in a timely manner; business activity and profitability - to assess asset turnover and financial performance; financial stability - to assess the structure of asset financing sources; production activity-to assess the state of fixed assets and the efficiency of the use of labor resources [22-24]. We denote the belonging of the indicator X_i to the j-th group as $X_i^{(j)}$.

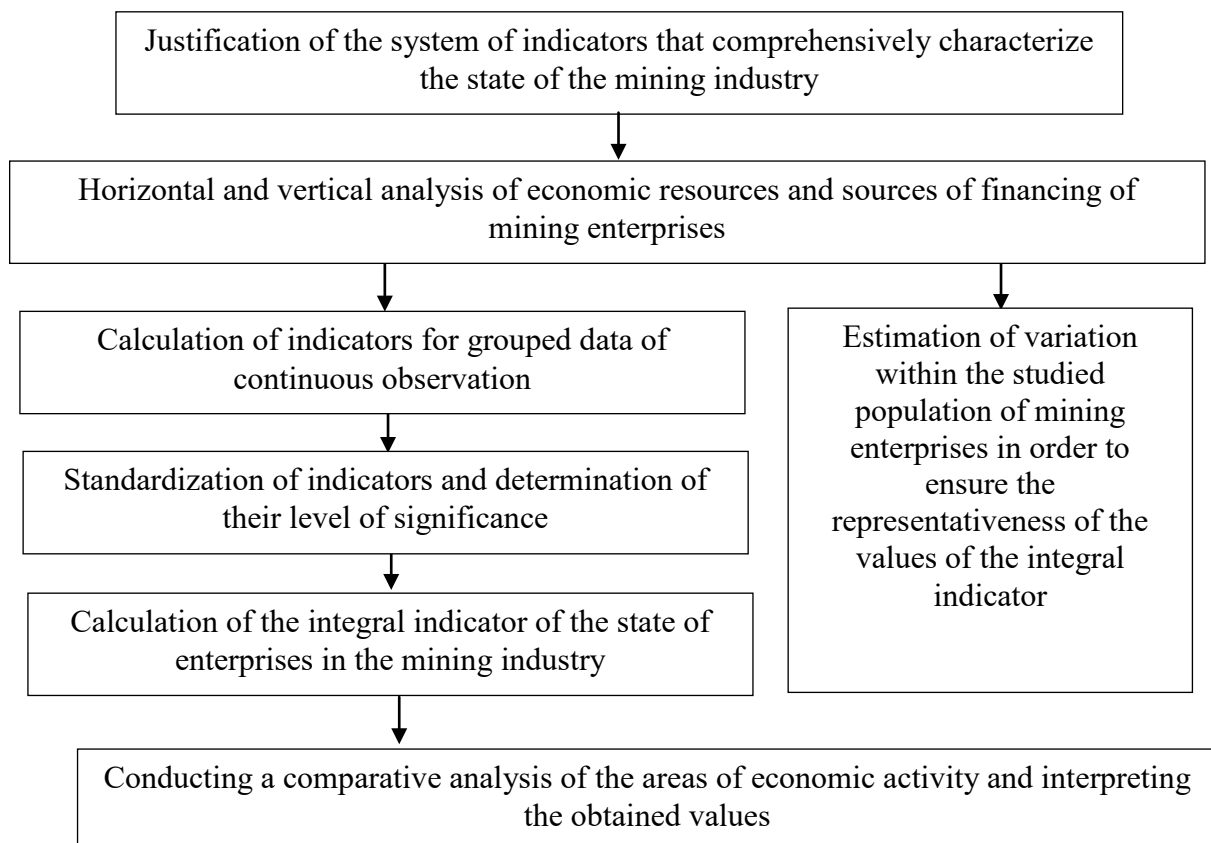


Fig. 1. Model for diagnosing the results of the mining industry in the context of sustainable development.

4. Results

The next stage of the methodological approach, Fig. 1, provides for a horizontal and vertical analysis of economic resources and sources of their financing at mining enterprises based on grouped statistical data in the context of sustainable development (Table 3). This analysis allows us to identify general trends, characterize the current state and structural changes in the property status of enterprises both in the mining industry as a whole and for individual types of economic activity [25-27].

The data in Table 3 indicate that the increase in the sources of financing of mining enterprises by +34754,5 mln UAH was due to the redistribution of funds between the amount of equity capital and current liabilities. So, during 2017-2019, the volume of equity capital decreased by -29838,3 mln UAH, or by -12.6%. At the same time, current liabilities increased by +64336,1 mln UAH, or by +14.4%. This growth was caused by an increase in current accounts payable by +11.9% and other current liabilities by +2.2%.

Table 3. Horizontal and vertical analysis of the property status of mining enterprises during 2017-2019, mln. UAH.

Positions	Beginning of 2018	Beginning of 2020	Absolute change	Specific weight, %		Structural shifts, %
				At the beginning	At the end	
Asset						
Non-current assets	196646,9	200211,1	3564,2	61,2%	56,2%	-5,0%
Current assets	124479,1	155663,4	31184,3	38,8%	43,8%	5,0%
Inventories	21929,2	25370,9	3441,7	6,8%	7,1%	0,3%
Accounts receivable	84201,1	113435,7	29234,6	26,2%	31,9%	5,7%
Cash	11518,3	6080,3	-5438,0	3,6%	1,7%	-1,9%
Other current assets	6830,5	10776,5	3946,0	2,1%	3,0%	0,9%
Non-current assets of the group disposals	38,8	44,8	6,0	0,0%	0,0%	0,0%
Total	321164,8	355919,3	34754,5	100,0%	100,0%	0,0%
Liabilities						
Equity	140255,4	110417,1	-29838,3	43,7%	31,0%	-12,6%
Long-term liabilities	58554,0	58835,4	281,4	18,2%	16,5%	-1,7%
Current liabilities:	122320,4	186656,5	64336,1	38,1%	52,4%	14,4%
Short-term bank loans	12071,5	14254,8	2183,3	3,8%	4,0%	0,2%
Current accounts payable	71039,7	121244,4	50204,7	22,1%	34,1%	11,9%
Other current liabilities	39209,2	51157,3	11948,1	12,2%	14,4%	2,2%
Liabilities related to non-current assets and disposal groups	35,0	10,3	-24,7	0,0%	0,0%	0,0%
Total	321164,8	355919,3	34754,5	100,0%	100,0%	0,0%

The volume of long-term liabilities decreased slightly by -281,4 mln UAH, or by -1.7%. As a result of these changes, the share of equity at the beginning of 2018 was 31.0%, long-term liabilities -16.5%, and current liabilities - 52.4%.

Such a structure of sources of financing of economic assets from the point of view of financial analysis is extremely risky, since:

- the presence of short-term debt obligations in the amount of 186656,5 mln UAH by the beginning of 2020 practically excludes their timely repayment. Therefore, most mining companies have significant liquidity problems;

- from the point of view of financial stability, the equity capital has a critically small volume, which is almost 2 times inferior to non-current assets. Even taking into account long-term liabilities, the amount of own and equivalent funds is 84.5% of non-current assets.

Thus, the need to repay large volumes of short-term accounts payable on the one hand and the impossibility of additional borrowing due to a low share of equity capital on the other hand, puts the

vast majority of extractive industry enterprises on the verge of bankruptcy. The situation is aggravated by the fact that the existing trends in the structure of sources of financing of economic funds are negative, that is, the mining industry has annually worsened its financial condition. Since the state has limited financial resources, such an analysis should be carried out for all types of economic activity in order to determine the most priority areas of regulation.

There were negative changes in the structure of economic assets during 2017-2019. Thus, the share of non-current assets decreased by 5.0% and at the beginning of 2020 was 56.2%. The corresponding increase in current assets was primarily due to accounts receivable. Its volume increased by +29234,6 mln UAH and at the end of the reporting period amounted to 31.9%. Therefore, the late receipt of funds for the delivered products and significant amounts of accumulated receivables only worsen the liquidity of the balance sheet of mining enterprises.

Thus, taking into account the important role of the extractive industry in the system of intersectoral relations and the orientation of its products exclusively to intermediate demand, the crisis of non-payments and the lack of funds for economic activity threaten not only the existence of this industry, but also the economic security of the state [21, 23].

The only internal source of replenishment of equity capital, except for privatization, or additional issue of shares, is retained earnings. However, the volume of net profit of mining enterprises amounted to: 2017 -9022,4 mln UAH; 2018 -9967,6 mln UAH; 2019 - -23124,9 mln UAH. Thus, the return on total capital is a negative value, which eventually leads to a decrease in equity. So, in addition to financial problems with liquidity and financial stability, the vast majority of mining enterprises are unprofitable.

The analysis of assets and sources of their provision characterized the generalized state of the majority of enterprises in the industry for all types of economic activity. However, Table 2 shows that the average annual growth rate of the volume of products sold for different industries differed significantly. It is known from the theory of economic analysis that this indicator directly affects the level of business activity and profitability of business entities, and therefore their financial and economic condition [25, 26]. Thus, it is necessary to determine the priority areas of state regulation in the mining industry on the basis of a detailed analysis for each type of economic activity. The unprofitable activity of recent years has led to the fact that the equity capital due to accumulated uncovered losses at the beginning of 2020 was -12192,8 mln UAH, or -17.0% of the total volume of financing sources [24, 25]. In fact, all economic activities are fully financed by accounts payable. Having limited access to long-term sources of borrowing, the share of current liabilities increased to 73.3%, where current accounts payable is 42.8%. Thus, to date, the majority of coal mining enterprises are insolvent with large amounts of accumulated short-term and long-term liabilities. The negative dynamics of recent years indicates that this problem is not being solved at the state level in any way.

The structure of assets indicates a lack of working capital for carrying out economic activities, since: the share of current assets at the beginning of 2020 was 37.1%, of which 22.5% was accounts receivable. In fact, only 14.6% of current assets remained at the disposal of enterprises to ensure the production process. Therefore, it can be assumed that the enterprises for the extraction of hard and brown coal do not have enough working capital to fully load production capacities.

During 2017-2019, there were negative changes in the structure of funding sources: a reduction in the share of equity by -23.6% to the level of 35.0%, with a simultaneous increase in current liabilities by + 21.1% to the level of 55.1%. The occurrence of current debt of this volume means that for a long time there are problems with the liquidity of the balance sheet in most oil and gas production enterprises. A characteristic difference from other types of economic activity is the low level of attracting bank lending: long-term and short-term loans from banks in total do not exceed 13.5% of the total volume of economic funds. From the point of view of financial stability and solvency, this is positive. However, underestimating the role of long-term liabilities in the case of profitable activities leads to a slowdown in the growth of equity at the expense of retained earnings, in accordance with the effect of financial leverage.

In the structure of assets, a pronounced problem is the lack of working capital. Taking into account that the share of current assets at the beginning of 2020 was 37.4%, and the volume of accounts receivable was 28.1%, only 9.3% remained for enterprises to ensure the production process, which is an extremely low level.

These problems of oil and gas production enterprises tended to worsen during the study period. Thus, although the average annual growth rate of the volume of products sold according to Table. 2 was + 1.5%, their financial and economic situation continues to deteriorate rapidly.

Production enterprises for the extraction of metal ores at the beginning of 2018 had the best structure of liabilities among the enterprises of the extractive industry with a share of equity at the level of 51.0%, which is positive. However, the dynamics and structure of liabilities indicate a high dependence on current accounts payable, the share of which at the beginning of 2018 was 15.0%, and at the beginning of 2020 - 41.5%. This indicates a typical problem of asset liquidity for the mining industry. The reason for this is the high share of short-term receivables among extractive industry enterprises at the beginning of 2020 was 37.7%.

5. Conclusion

As we can see, in the context of sustainable development, the crisis of non-payments leads to the diversion of current assets from circulation due to the accumulation of receivables. This, in turn, leads to a loss of liquidity, the inability to repay short-term liabilities in a timely manner and the formation of excessive volumes of current liabilities. Given the high integration of mining enterprises into the system of intersectoral relations, this problem cannot be solved within the framework of one industry. Therefore, taking into account the existing experience, it requires complex measures:

- accounts receivable are formed as a result of late payment for delivered products. The main consumers of the extractive industry, as it was found out above, are: the processing industry, the supply of electricity, gas, air conditioning and transport. They consume more than 87% of the products of this industry in the intermediate consumption market and are the most debtors;
- on the other hand, these regions are also the largest suppliers of raw materials, materials and semi-finished products for the extractive industry. Therefore, in the end, the accumulation of current accounts payable at the enterprises of the extractive industry for the delivered goods and services is the least desirable for them.

References

- [1] Amosha O I 2013 State, main problems and prospects of the coal industry of Ukraine. (NAS of Ukraine, Industrial Economics: Donetsk) p 44
- [2] Perevozova I, Shmygol N, Tereshchenko D, Kandahura K and Katerna O 2019 Introduction of creative economy in international relations: Aspects of development security. *Journal of Security and Sustainability Issues* **9(1)** 139–154
- [3] Shmygol N, Solovyov O, Kasianok M, Cherniavska O, Pawlisczy D 2021 Model of sectoral competitiveness index by environmental component. *IOP Conference Series: Earth and Environmental Science* **628(1)** 012023
- [4] Shmygol N, Łuczka Wł, Trokhymets O, Pawlisczy D and Zavgorodniy R 2020 Model of diagnostics of resource efficiency in oil and gas sector of economy of Ukraine *E3S Web of Conf.* **166** 13005
- [5] Shmygol N, Cherniavska O, Pulina T and Zavgorodniy R 2020 Economic assessment of the implementation of the resource-efficient strategy in the oil and gas sector of the economy on the basis of distribution of trade margins between extracting and processing enterprises *Polityka Energetyczna* **23(3)** 135–146.
- [6] Zavidna L, Makarenko P M, Chepurda G, Lyzunova O and Shmygol N 2019 Strategy of innovative development as an element to activate innovative activities of companies *Academy of Strategic Management Journal* **18(4)**

- [7] Shmygol N, Galtsova O, Solovyov O, Koval V and Arsawan I. 2020 Analysis of country's competitiveness factors based on inter-state rating comparisons E3S Web Conf. **153** 03001
- [8] Mikhno I, Koval V, Korenyuk P, Smutchak Z and Bozhanova V 2021 Modeling corporate games to increase the ecological value of entrepreneurship and innovative business E3S Web of Conferences **255** 01027.
- [9] Yankovyi O, Goncharov Yu, Koval V and Lositska T 2019 Optimization of the capital-labor ratio on the basis of production functions in the economic model of production Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu **4** 134-140
- [10] Yeshchenko M, Koval V & Tsvirko O 2019 Economic policy priorities of the income regulation. *Espacios* **40 (38)** 1
- [11] Kolyadenko S V 2011 Structural changes in the economy of the regions as a guarantee of economic growth. *Efficient economy*. <http://www.economy.nayka.com.ua/?op=1&z=675>
- [12] Orlova K E 2011 Analysis and forecasting of the extractive industry of Zhytomyr region. *Sustainable economic development* **4** 130–136.
- [13] Karpinsky B A 2008 Financial and economic activity of enterprises of the coal industry of Ukraine: realities and prospects. *Finance of Ukraine* **8** 63-73
- [14] Dykan V.L 2010 Conceptual approach to the elimination of crisis phenomena in the industrial and transport sectors of the economy Railway transport of Ukraine **4** 50-51
- [15] Andrusiv U, Zelinska H, Kupalova H, Galtsova O, Marynychak L and Dovgal O 2021 Optimization of Balance Components of Fuel and Energy Resources for Organizational and Economic Support of Energy Efficiency in Ukraine *Ecological Engineering & Environmental Technology* **22(6)** 27-35
- [16] Terebukh A A 1999 Review of modern methods of financial diagnostics of the enterprise. The role of the financial and credit system in stimulating economic growth in Ukraine (Lutsk: "Tower" Volyn. state un-ty them. L. Ukrainka) p 196–200
- [17] Zakharchenko V O 2005 Systematization of methods for assessing the financial condition of the enterprise. *Finance of Ukraine* **1** 137–144.
- [18] Evseeva O O 2011 Methodical approach to the development of a system of indicators and forecasting of socio-economic development of the region. *Economic space* **46** 62–73.
- [19] Rybalka O 2005 Formation of a system of indicators of the financial condition of the enterprise to assess the probability of bankruptcy *Economist* **9** 63–65.
- [20] Polishchuk N V 2005 Effectiveness of business entities: essence, evaluation, basics of regulation (K.: KNTEU) p 252
- [21] Marchenko O M 2008 Methodical bases of an estimation of a financial component of economic safety on balance indicators. *Economic sc. Collection of sc. papers. Chernivtsi* **4(13)** 396–403
- [22] Shvidanenko G O 2002 Modern technology of diagnostics of financial and economic activity of the enterpris (Kyiv: KNEU) p 192
- [23] Krivovyazyuk I V 2007 Economic diagnostics of the enterprise: theory, methodology and practice of application (Lutsk: "Nadstyria" Publishing House) p 260
- [24] Kryvovyazyuk I V 2010 Mathematical and statistical modeling in financial diagnostics of enterprises *Efficient economy*. <http://www.economy.nayka.com.ua/?op=1&z=208>
- [25] Lakhtionova L A 2001 Financial analysis of business entities (Kyiv: KNEU) p 387
- [26] Voronkova A E 2008 Diagnosis of the state of the enterprise: theory and practice (X.: VD "Inzhek") p 520
- [27] Krivovyazyuk I V 2007 Theoretical principles of financial diagnostics of the enterprise. *Economic sciences* **4 (15)** 232–247

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.